

```
In [1]: import Pkg
        Pkg.activate(@__DIR__)
        Pkg.instantiate()
        using LinearAlgebra, Plots
        import ForwardDiff as FD
        import MeshCat as mc
        using Test
```

Activating environment at `/home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1\_S24/Project.toml`

## Julia Warmup

Just like Python, Julia lets you do the following:

```
In [2]: let
        x = [1,2,3]
        @show x
        y = x # NEVER DO THIS, EDITING ONE WILL NOW EDIT BOTH

        y[3] = 100 # this will now modify both y and x
        x[1] = 300 # this will now modify both y and x

        @show y
        @show x
    end
```

```
x = [1, 2, 3]
y = [300, 2, 100]
x = [300, 2, 100]
```

```
3-element Vector{Int64}:
 300
   2
 100
```

In [3]: *# to avoid this, here are two alternatives*

```
let
    x = [1,2,3]
    @show x

    y1 = 1*x           # this is fine
    y2 = deepcopy(x) # this is also fine

    x[2] = 200 # only edits x
    y1[1] = 400 # only edits y1
    y2[3] = 100 # only edits y2

    @show x
    @show y1
    @show y2
end
```

```
x = [1, 2, 3]
x = [1, 200, 3]
y1 = [400, 2, 3]
y2 = [1, 2, 100]
```

```
3-element Vector{Int64}:
 1
 2
100
```

## Optional function arguments

We can have optional keyword arguments for functions in Julia, like the following:

In [4]: *## optional arguments in functions*

```
# we can have functions with optional arguments after a ; that have default values
let
    function f1(a, b; c=4, d=5)
        @show a,b,c,d
    end

    f1(1,2)           # this means c and d will take on default value
    f1(1,2;c = 100,d = 2) # specify c and d
    f1(1,2;d = -30)    # or we can only specify one of them
end
```

```
(a, b, c, d) = (1, 2, 4, 5)
(a, b, c, d) = (1, 2, 100, 2)
(a, b, c, d) = (1, 2, 4, -30)

(1, 2, 4, -30)
```

## Q1: Integration (25 pts)

In this question we are going to integrate the equations of motion for a double pendulum using multiple explicit and implicit integrators. We will write a generic simulation function for each of the two categories (explicit and implicit), and compare 6 different integrators.

The continuous time dynamics of the cartpole are written as a function:

$$\dot{x} = f(x)$$

In the code you will see `xdot = dynamics(params, x)` .

### Part A (10 pts): Explicit Integration

Here we are going to implement the following explicit integrators:

- Forward Euler (explicit)
- Midpoint (explicit)
- RK4 (explicit)

```

In [5]: # these two functions are given, no TODO's here
function double_pendulum_dynamics(params::NamedTuple, x::Vector)
    # continuous time dynamics for a double pendulum given state x,
    # also known as the "equations of motion".
    # returns the time derivative of the state,  $\dot{x}$  (dx/dt)

    # the state is the following:
     $\theta_1, \dot{\theta}_1, \theta_2, \dot{\theta}_2 = x$ 

    # system parameters
    m1, m2, L1, L2, g = params.m1, params.m2, params.L1, params.L2, params.g

    # dynamics
    c = cos( $\theta_1 - \theta_2$ )
    s = sin( $\theta_1 - \theta_2$ )

     $\dot{x} = [$ 
         $\dot{\theta}_1;$ 
         $(m_2 * g * \sin(\theta_2) * c - m_2 * s * (L_1 * c * \dot{\theta}_1^2 + L_2 * \dot{\theta}_2^2) - (m_1 + m_2) * g * \sin(\theta_1)) /$ 
         $(L_1 * (m_1 + m_2 * s^2));$ 
         $\dot{\theta}_2;$ 
         $((m_1 + m_2) * (L_1 * \dot{\theta}_1^2 * s - g * \sin(\theta_2) + g * \sin(\theta_1) * c) + m_2 * L_2 * \dot{\theta}_2^2 * s * c) / (L_2$ 
         $* (m_1 + m_2 * s^2));$ 
     $]$ 

    return  $\dot{x}$ 
end
function double_pendulum_energy(params::NamedTuple, x::Vector)::Real
    # calculate the total energy (kinetic + potential) of a double pendulum gi
    ven a state x

    # the state is the following:
     $\theta_1, \dot{\theta}_1, \theta_2, \dot{\theta}_2 = x$ 

    # system parameters
    m1, m2, L1, L2, g = params.m1, params.m2, params.L1, params.L2, params.g

    # cartesian positions/velocities of the masses
    r1 = [L1*sin( $\theta_1$ ), 0, -params.L1*cos( $\theta_1$ ) + 2]
    r2 = r1 + [params.L2*sin( $\theta_2$ ), 0, -params.L2*cos( $\theta_2$ )]
    v1 = [L1* $\dot{\theta}_1$ *cos( $\theta_1$ ), 0, L1* $\dot{\theta}_1$ *sin( $\theta_1$ )]
    v2 = v1 + [L2* $\dot{\theta}_2$ *cos( $\theta_2$ ), 0, L2* $\dot{\theta}_2$ *sin( $\theta_2$ )]

    # energy calculation
    kinetic = 0.5*(m1*v1'*v1 + m2*v2'*v2)
    potential = m1*g*r1[3] + m2*g*r2[3]
    return kinetic + potential
end

```

double\_pendulum\_energy (generic function with 1 method)

Now we are going to simulate this double pendulum by integrating the equations of motion with the simplest explicit integrator, the Forward Euler method:

$$x_{k+1} = x_k + \Delta t \cdot f(x_k) \quad \text{Forward Euler (explicit)}$$

```
In [6]: """
        x_{k+1} = forward_euler(params, dynamics, x_k, dt)

        Given  $\dot{x} = \text{dynamics}(\text{params}, x)$ , take in the current state  $x$  and integrate i
        t forward  $\Delta t$ 
        using Forward Euler method.
        """

        function forward_euler(params::NamedTuple, dynamics::Function, x::Vector, dt::
        Real)::Vector
            #  $\dot{x} = \text{dynamics}(\text{params}, x)$ 
            # TODO: implement forward euler
             $\dot{x} = \text{dynamics}(\text{params}, x)$ 
            x_kp1 = x + dt *  $\dot{x}$ 
            return x_kp1
        end
```

forward\_euler

```

In [7]: include(joinpath(@__DIR__, "animation.jl"))

let

    # parameters for the simulation
    params = (
        m1 = 1.0,
        m2 = 1.0,
        L1 = 1.0,
        L2 = 1.0,
        g = 9.8
    )

    # initial condition
    x0 = [pi/1.6; 0; pi/1.8; 0]

    # time step size (s)
    dt = 0.01
    tf = 30.0
    t_vec = 0:dt:tf
    N = length(t_vec)

    # store the trajectory in a vector of vectors
    X = [zeros(4) for i = 1:N]
    X[1] = 1*x0

    # TODO: simulate the double pendulum with `forward_euler`
    #  $X[k] = \dot{x}_k$ , so  $X[k+1] = \text{forward\_euler}(\text{params}, \text{double\_pendulum\_dynamics}, X[k], dt)$ 
    for k = 1:N-1
        X[k+1] = forward_euler(params, double_pendulum_dynamics, X[k], dt)
    end

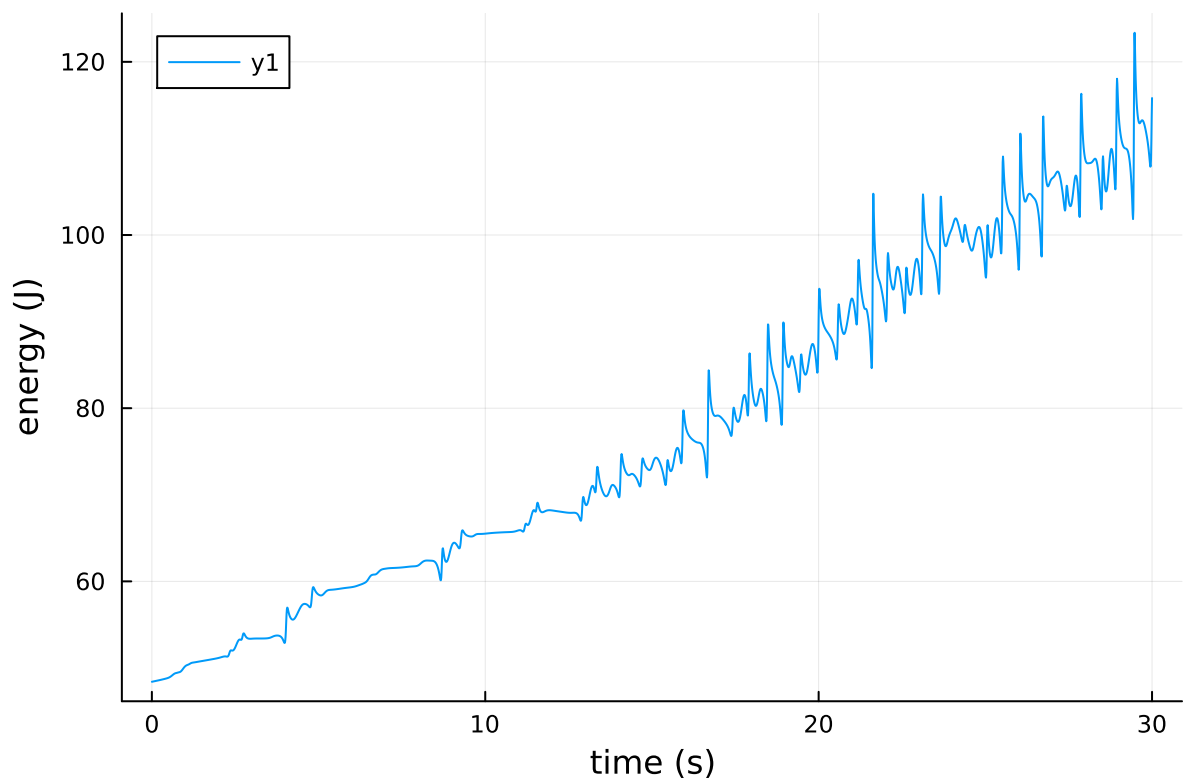
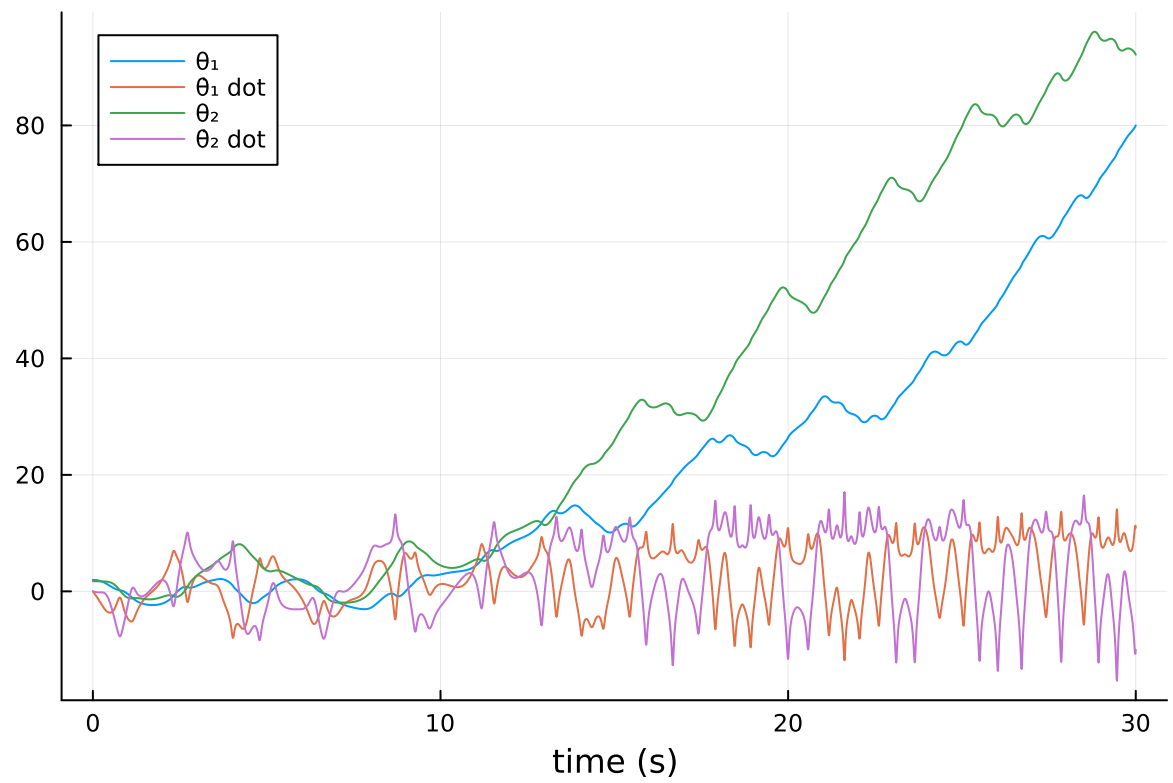
    # calculate energy
    E = [double_pendulum_energy(params,x) for x in X]

    @show @test norm(X[end]) > 1e-10 # make sure all X's were updated
    @show @test 2 < (E[end]/E[1]) < 3 # energy should be increasing

    # plot state history, energy history, and animate it
    display(plot(t_vec, hcat(X...)', xlabel = "time (s)", label = [" $\theta_1$ " " $\dot{\theta}_1$ " " $\theta_2$ " " $\dot{\theta}_2$ " " $\dot{\theta}_2$  dot"]))
    display(plot(t_vec, E, xlabel = "time (s)", ylabel = "energy (J)"))
    meshcat_animate(params,X,dt,N)

end

```



```

# = /home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1_S24/Q1.ipynb:37 =# @test
(norm(X[end]) > 1.0e-10) = Test Passed
# = /home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1_S24/Q1.ipynb:38 =# @test
(2 < E[end] / E[1] < 3) = Test Passed

```

```
└ Info: MeshCat server started. You can open the visualizer by visiting the f
ollowing URL in your browser:
└ http://127.0.0.1:8700
└ @ MeshCat /root/.julia/packages/MeshCat/vWPbP/src/visualizer.jl:73
```

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Now let's implement the next two integrators:

**Midpoint:**

$$x_m = x_k + \frac{\Delta t}{2} \cdot f(x_k)$$
$$x_{k+1} = x_k + \Delta t \cdot f(x_m)$$

**RK4:**

$$k_1 = \Delta t \cdot f(x_k)$$
$$k_2 = \Delta t \cdot f(x_k + k_1/2)$$
$$k_3 = \Delta t \cdot f(x_k + k_2/2)$$
$$k_4 = \Delta t \cdot f(x_k + k_3)$$
$$x_{k+1} = x_k + (1/6) \cdot (k_1 + 2k_2 + 2k_3 + k_4)$$



```
In [33]: function midpoint(params::NamedTuple, dynamics::Function, x::Vector, dt::Real)
::Vector
    # TODO: implement explicit midpoint
    x_m = x + 0.5*dt*dynamics(params, x)
    x_kp1 = x + dt*dynamics(params, x_m)
    return x_kp1
end

function rk4(params::NamedTuple, dynamics::Function, x::Vector, dt::Real)::Vector
    # TODO: implement RK4
    k1 = dt*dynamics(params, x)
    k2 = dt*dynamics(params, x + k1/2)
    k3 = dt*dynamics(params, x + k2/2)
    k4 = dt*dynamics(params, x + k3)
    x_kp1 = x + 1/6*(k1 + 2*k2 + 2*k3 + k4)
    return x_kp1
end
```

rk4 (generic function with 1 method)

```
In [19]: function simulate_explicit(params::NamedTuple,dynamics::Function,integrator::Function,x0::Vector,dt::Real,tf::Real)
    # TODO: update this function to simulate dynamics forward
    # with the given explicit integrator

    # take in
    t_vec = 0:dt:tf
    N = length(t_vec)
    X = [zeros(length(x0)) for i = 1:N]
    X[1] = x0

    # TODO: simulate X forward
    for k = 1:N-1
        X[k+1] = integrator(params, dynamics, X[k], dt)
    end

    # return state history X and energy E
    E = [double_pendulum_energy(params,x) for x in X]
    return X, E
end
```

simulate\_explicit (generic function with 1 method)

```
In [10]: # initial condition
const x0 = [pi/1.6; 0; pi/1.8; 0]

const params = (
    m1 = 1.0,
    m2 = 1.0,
    L1 = 1.0,
    L2 = 1.0,
    g = 9.8
)
```

```
(m1 = 1.0, m2 = 1.0, L1 = 1.0, L2 = 1.0, g = 9.8)
```

## Part B (10 pts): Implicit Integrators

Explicit integrators work by calling a function with  $x_k$  and  $\Delta t$  as arguments, and returning  $x_{k+1}$  like this:

$$x_{k+1} = f_{explicit}(x_k, \Delta t)$$

Implicit integrators on the other hand have the following relationship between the state at  $x_k$  and  $x_{k+1}$ :

$$f_{implicit}(x_k, x_{k+1}, \Delta t) = 0$$

This means that if we want to get  $x_{k+1}$  from  $x_k$ , we have to solve for a  $x_{k+1}$  that satisfies the above equation. This is a rootfinding problem in  $x_{k+1}$  (our unknown), so we just have to use Newton's method.

Here are the three implicit integrators we are looking at, the first being Backward Euler (1st order):

$$f(x_k, x_{k+1}, \Delta t) = x_k + \Delta t \cdot \dot{x}_{k+1} - x_{k+1} = 0 \quad \text{Backward Euler}$$

Implicit Midpoint (2nd order)

$$x_{k+1/2} = \frac{1}{2}(x_k + x_{k+1})$$

$$f(x_k, x_{k+1}, \Delta t) = x_k + \Delta t \cdot \dot{x}_{k+1/2} - x_{k+1} = 0 \quad \text{Implicit Midpoint}$$

Hermite Simpson (3rd order)

$$x_{k+1/2} = \frac{1}{2}(x_k + x_{k+1}) + \frac{\Delta t}{8}(\dot{x}_k - \dot{x}_{k+1})$$

$$f(x_k, x_{k+1}, \Delta t) = x_k + \frac{\Delta t}{6} \cdot (\dot{x}_k + 4\dot{x}_{k+1/2} + \dot{x}_{k+1}) - x_{k+1} = 0 \quad \text{Hermite-Simpson}$$

When you implement these integrators, you will update the functions such that they take in a dynamics function,  $x_k$  and  $x_{k+1}$ , and return the residuals described above. We are NOT solving these yet, we are simply returning the residuals for each implicit integrator that we want to be 0.

```

In [30]: # since these are explicit integrators, these function will return the residuals described above
# NOTE: we are NOT solving anything here, simply return the residuals
function backward_euler(params::NamedTuple, dynamics::Function, x1::Vector, x2::Vector, dt::Real)::Vector
     $\dot{x}_{kp1}$  = dynamics(params, x2)
    res = x1 + dt* $\dot{x}_{kp1}$  - x2
    return res
end

function implicit_midpoint(params::NamedTuple, dynamics::Function, x1::Vector, x2::Vector, dt::Real)::Vector
    x_kpm = 1/2*(x1 + x2)
     $\dot{x}_{kpm}$  = dynamics(params, x_kpm)
    res = x1 + dt* $\dot{x}_{kpm}$  - x2
    return res
end

function hermite_simpson(params::NamedTuple, dynamics::Function, x1::Vector, x2::Vector, dt::Real)::Vector
     $\dot{x}_k$  = dynamics(params, x1)
     $\dot{x}_{kp1}$  = dynamics(params, x2)
    x_kpm = 1/2*(x1 + x2) + dt/8*( $\dot{x}_k$  -  $\dot{x}_{kp1}$ )
     $\dot{x}_{kpm}$  = dynamics(params, x_kpm)
    res = x1 + dt/6*( $\dot{x}_k$  + 4* $\dot{x}_{kpm}$  +  $\dot{x}_{kp1}$ ) - x2
    return res
end

```

hermite\_simpson (generic function with 1 method)

```
In [23]: # TODO
# this function takes in a dynamics function, implicit integrator function, and x1
# and uses Newton's method to solve for an x2 that satisfies the implicit integration equations
# that we wrote about in the functions above
function implicit_integrator_solve(params::NamedTuple, dynamics::Function, implicit_integrator::Function, x1::Vector, dt::Real; tol = 1e-13, max_iters = 10)::Vector

    # initialize guess
    x2 = 1*x1

    # TODO: use Newton's method to solve for x2 such that residual for the integrator is 0
    # DO NOT USE A WHILE LOOP

    for i = 1:max_iters
        residual = implicit_integrator(params, dynamics, x1, x2, dt)
        if norm(residual) < tol
            return x2
        end
        Δx = - FD.jacobian(_x2 -> implicit_integrator(params, dynamics, x1, _x2, dt), x2) \ residual
        # TODO: return x2 when the norm of the residual is below tol
        x2 += Δx
    end
    error("implicit integrator solve failed")
end

implicit_integrator_solve (generic function with 1 method)
```

```
In [24]: @testset "implicit integrator check" begin

    dt = 1e-1
    x1 = [.1, .2, .3, .4]

    for integrator in [backward_euler, implicit_midpoint, hermite_simpson]
        println("-----testing $integrator -----")
        x2 = implicit_integrator_solve(params, double_pendulum_dynamics, integrator, x1, dt)
        @test norm(integrator(params, double_pendulum_dynamics, x1, x2, dt)) < 1e-10
    end

end

-----testing backward_euler -----
-----testing implicit_midpoint -----
-----testing hermite_simpson -----
Test Summary: | Pass Total
implicit integrator check | 3 3

Test.DefaultTestSet("implicit integrator check", Any[], 3, false, false)
```

```

In [25]: function simulate_implicit(params::NamedTuple,dynamics::Function,implicit_integrator::Function,x0::Vector,dt::Real,tf::Real; tol = 1e-13)
    t_vec = 0:dt:tf
    N = length(t_vec)
    X = [zeros(length(x0)) for i = 1:N]
    X[1] = x0

    # TODO: do a forward simulation with the selected implicit integrator
    # hint: use your `implicit_integrator_solve` function
    for k = 1:N-1
        X[k+1] = implicit_integrator_solve(params, dynamics, implicit_integrator, X[k], dt)
    end

    E = [double_pendulum_energy(params,x) for x in X]
    @assert length(X)==N
    @assert length(E)==N
    return X, E
end

```

simulate\_implicit (generic function with 1 method)

```

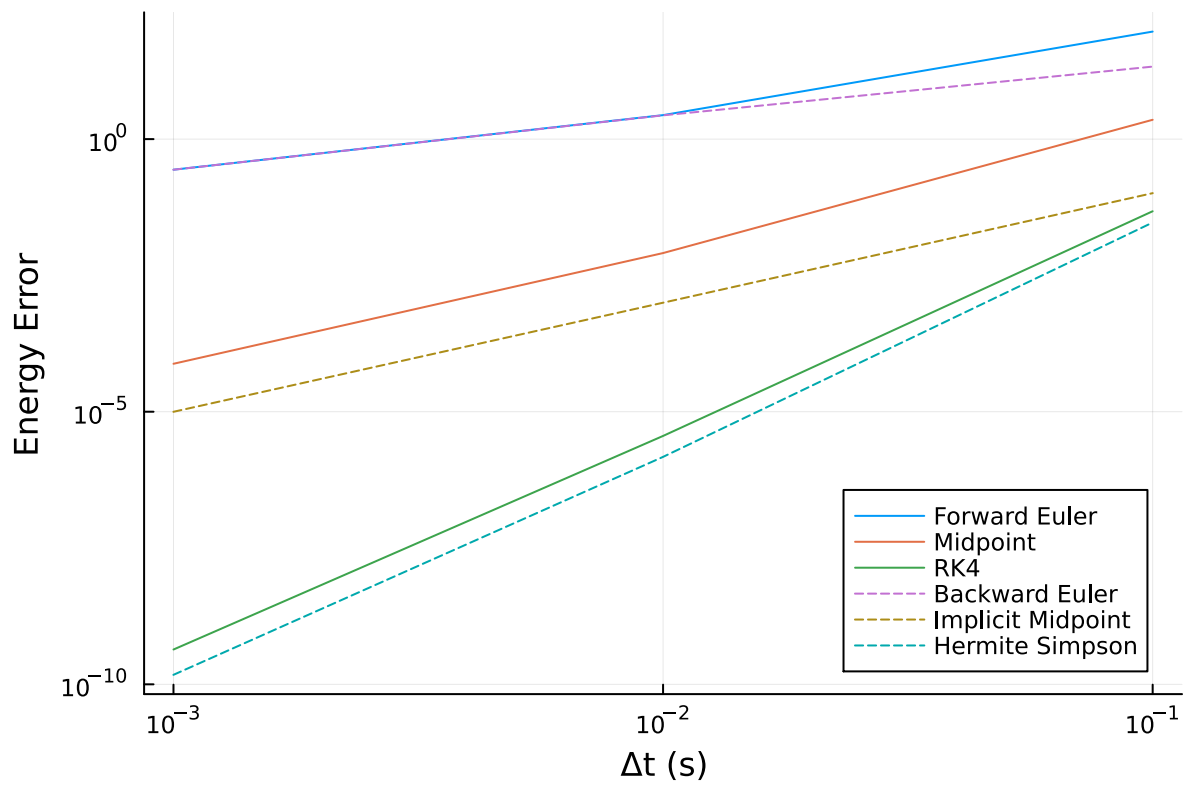
In [34]: function max_err_E(E)
           E0 = E[1]
           err = abs.(E .- E0)
           return maximum(err)
       end
       function get_explicit_energy_error(integrator::Function, dts::Vector)
           [max_err_E(simulate_explicit(params,double_pendulum_dynamics,integrator,x
0,dt,tf)[2]) for dt in dts]
       end
       function get_implicit_energy_error(integrator::Function, dts::Vector)
           [max_err_E(simulate_implicit(params,double_pendulum_dynamics,integrator,x
0,dt,tf)[2]) for dt in dts]
       end

       const tf = 2.0
       let
           # here we compare everything
           dts = [1e-3,1e-2,1e-1]
           explicit_integrators = [forward_euler, midpoint, rk4]
           implicit_integrators = [backward_euler, implicit_midpoint, hermite_simpso
n]

           explicit_data = [get_explicit_energy_error(integrator, dts) for integrator
in explicit_integrators]
           implicit_data = [get_implicit_energy_error(integrator, dts) for integrator
in implicit_integrators]

           plot(dts, hcat(explicit_data...),label = ["Forward Euler" "Midpoint" "RK
4"],xaxis=:log10,yaxis=:log10, xlabel = "Δt (s)", ylabel = "Energy Error")
           plot!(dts, hcat(implicit_data...),ls = :dash, label = ["Backward Euler" "I
mplicit Midpoint" "Hermite Simpson"])
           plot!(legend=:bottomright)
       end

```



What we can see above is the maximum energy error for each of the integration methods. In general, the implicit methods of the same order are slightly better than the explicit ones.

In [35]: @testset "energy behavior" begin

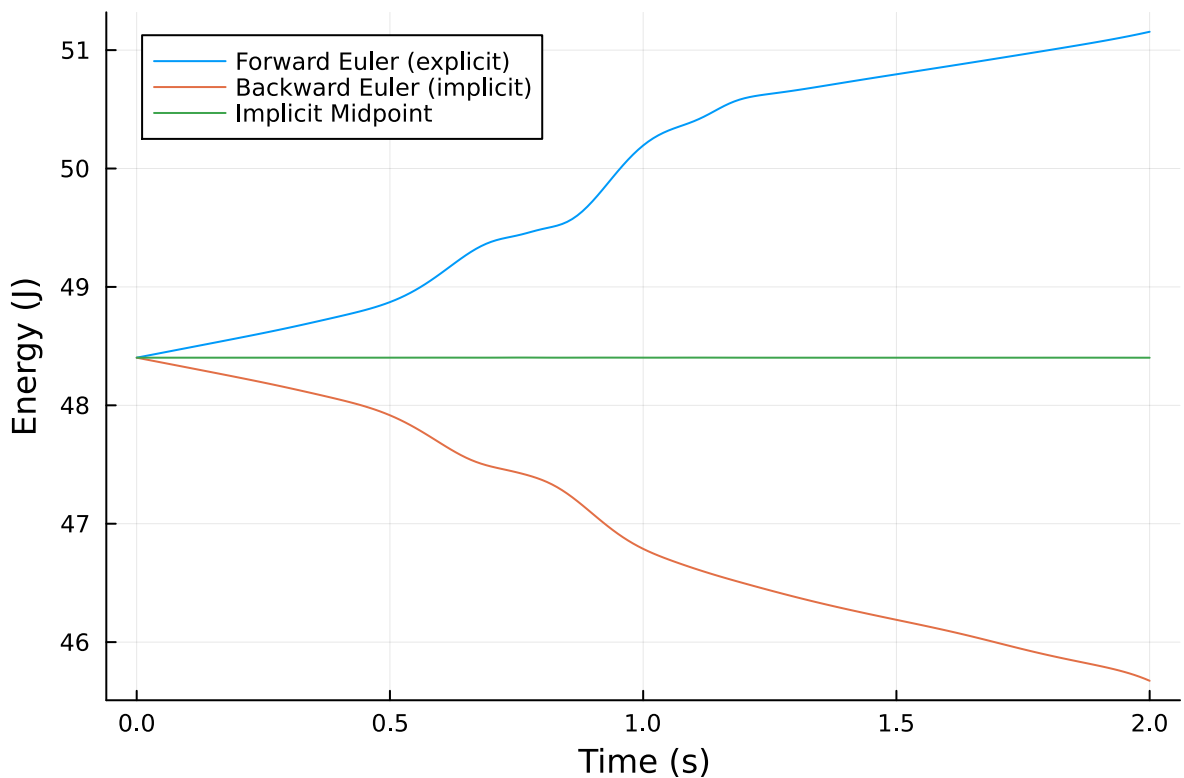
```
# simulate with all integrators
dt = 0.01
t_vec = 0:dt:tf
E1 = simulate_explicit(params,double_pendulum_dynamics,forward_euler,x0,d
t,tf)[2]
E2 = simulate_implicit(params,double_pendulum_dynamics,backward_euler,x0,d
t,tf)[2]
E3 = simulate_implicit(params,double_pendulum_dynamics,implicit_midpoint,x
0,dt,tf)[2]
E4 = simulate_implicit(params,double_pendulum_dynamics,hermite_simpson,x0,
dt,tf)[2]
E5 = simulate_explicit(params,double_pendulum_dynamics,midpoint,x0,dt,tf)
[2]
E6 = simulate_explicit(params,double_pendulum_dynamics,rk4,x0,dt,tf)[2]

# plot forward/backward euler and implicit midpoint
plot(t_vec,E1, label = "Forward Euler (explicit)")
plot!(t_vec,E2, label = "Backward Euler (implicit)")
display(plot!(t_vec,E3, label = "Implicit Midpoint",xlabel = "Time (s)", y
label="Energy (J)"))

# test energy behavior
E0 = E1[1]

@test 2.5 < (E1[end] - E0) < 3.0
@test -3.0 < (E2[end] - E0) < -2.5
@test abs(E3[end] - E0) < 1e-2
@test abs(E0 - E4[end]) < 1e-4
@test abs(E0 - E5[end]) < 1e-1
@test abs(E0 - E6[end]) < 1e-4
end
```





<b>Test Summary:</b>		<b>Pass</b>	<b>Total</b>
energy behavior		6	6

```
Test.DefaultTestSet("energy behavior", Any[], 6, false, false)
```

Another important takeaway from these integrators is that explicit Euler results in unstable behavior (as shown here by the growing energy), and implicit Euler results in artificial damping (losing energy). Implicit midpoint however maintains the correct energy. Even though the solution from implicit midpoint will vary from the initial energy, it does not move secularly one way or the other.

## Part C (5 pts): One sentence short answer

1. Describe the energy behavior of each integrator. Are there any that are clearly unstable?

**All integrators' energy errors increase as timestep size increases. Forward Euler is clearly unstable, as the energy grows without bound.**

```
In [2]: import Pkg
        Pkg.activate(@__DIR__)
        Pkg.instantiate()
        using LinearAlgebra, Plots
        import ForwardDiff as FD
        using MeshCat
        using Test
        using Plots
```

**Activating** environment at `/home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1\_S24/Project.toml`

## Q2: Equality Constrained Optimization (25 pts)

In this problem, we are going to use Newton's method to solve some constrained optimization problems. We will start with a smaller problem where we can experiment with Full Newton vs Gauss-Newton, then we will use these methods to solve for the motor torques that make a quadruped balance on one leg.

### Part A (10 pts)

Here we are going to solve some equality-constrained optimization problems with Newton's method. We are given a problem

$$\begin{array}{ll} \min_x & f(x) \\ \text{st} & c(x) = 0 \end{array}$$

Which has the following Lagrangian:

$$\mathcal{L}(x, \lambda) = f(x) + \lambda^T c(x),$$

and the following KKT conditions for optimality:

$$\begin{aligned} \nabla_x \mathcal{L} = \nabla_x f(x) + \left[ \frac{\partial c}{\partial x} \right]^T \lambda &= 0 \\ c(x) &= 0 \end{aligned}$$

Which is just a root-finding problem. To solve this, we are going to solve for a  $z = [x^T, \lambda]^T$  that satisfies these KKT conditions.

## Newton's Method with a Linesearch

We use Newton's method to solve for when  $r(z) = 0$ . To do this, we specify `res_fx(z)` as  $r(z)$ , and `res_jac_fx(z)` as  $\partial r / \partial z$ . To calculate a Newton step, we do the following:

$$\Delta z = - \left[ \frac{\partial r}{\partial z} \right]^{-1} r(z_k)$$

We then decide the step length with a linesearch that finds the largest  $\alpha \leq 1$  such that the following is true:

$$\phi(z_k + \alpha \Delta z) < \phi(z_k)$$

Where  $\phi$  is a "merit function", or `merit_fx(z)` in the code. In this assignment you will use a backtracking linesearch where  $\alpha$  is initialized as  $\alpha = 1.0$ , and is divided by 2 until the above condition is satisfied.

NOTE: YOU DO NOT NEED TO (AND SHOULD NOT) USE A WHILE LOOP ANYWHERE IN THIS ASSIGNMENT.

```

In [27]: function linesearch(z::Vector, Δz::Vector, merit_fx::Function;
                        max_ls_iters = 10)::Float64 # optional argument with a default
    # TODO: return maximum α≤1 such that merit_fx(z + α*Δz) < merit_fx(z)
    # with a backtracking linesearch (α = α/2 after each iteration)
    α = 1
    # NOTE: DO NOT USE A WHILE LOOP
    for i = 1:max_ls_iters

        # TODO: return α when merit_fx(z + α*Δz) < merit_fx(z)
        if merit_fx(z + α*Δz) < merit_fx(z)
            return α
        else
            α /= 2
        end
    end

    error("linesearch failed")
end

function newtons_method(z0::Vector, res_fx::Function, res_jac_fx::Function, merit_fx::Function;
                        tol = 1e-10, max_iters = 50, verbose = false)::Vector{Vector{Float64}}

    # TODO: implement Newton's method given the following inputs:
    # - z0, initial guess
    # - res_fx, residual function
    # - res_jac_fx, Jacobian of residual function wrt z
    # - merit_fx, merit function for use in linesearch

    # optional arguments
    # - tol, tolerance for convergence. Return when norm(residual)<tol
    # - max_iter, max # of iterations
    # - verbose, bool telling the function to output information at each iteration

    # return a vector of vectors containing the iterates
    # the last vector in this vector of vectors should be the approx. solution

    # NOTE: DO NOT USE A WHILE LOOP ANYWHERE

    # return the history of guesses as a vector
    Z = [zeros(length(z0)) for i = 1:max_iters]
    Z[1] = z0

    for i = 1:(max_iters - 1)

        # NOTE: everything here is a suggestion, do whatever you want to

        # TODO: evaluate current residual
        norm_r = norm(res_fx(Z[i]))

        if verbose

```

```

        print("iter: $i      |r|: $norm_r    ")
    end

    # TODO: check convergence with norm of residual < tol
    # if converged, return Z[1:i]
    if norm_r < tol
        return Z[1:i]
    end

    # TODO: caculate Newton step (don't forget the negative sign)
    ΔZ = - res_jac_fx(Z[i]) \ res_fx(Z[i])

    # TODO: Linesearch and update z
    α = linesearch(Z[i],ΔZ,merit_fx)
    Z[i+1] = Z[i] + α*ΔZ

    if verbose
        print("α: $α \n")
    end

end
error("Newton's method did not converge")
end

```

newtons\_method (generic function with 1 method)

In [28]: @testset "check Newton" begin

```

    f(_x) = [sin(_x[1]), cos(_x[2])]
    df(_x) = FD.jacobian(f, _x)
    merit(_x) = norm(f(_x))

    x0 = [-1.742410372590328, 1.4020334125022704]

    X = newtons_method(x0, f, df, merit; tol = 1e-10, max_iters = 50, verbose
= true)

    # check this took the correct number of iterations
    # if your linesearch isn't working, this will fail
    # you should see 1 iteration where α = 0.5
    @test length(X) == 6

    # check we actually converged
    @test norm(f(X[end])) < 1e-10

end

```

```

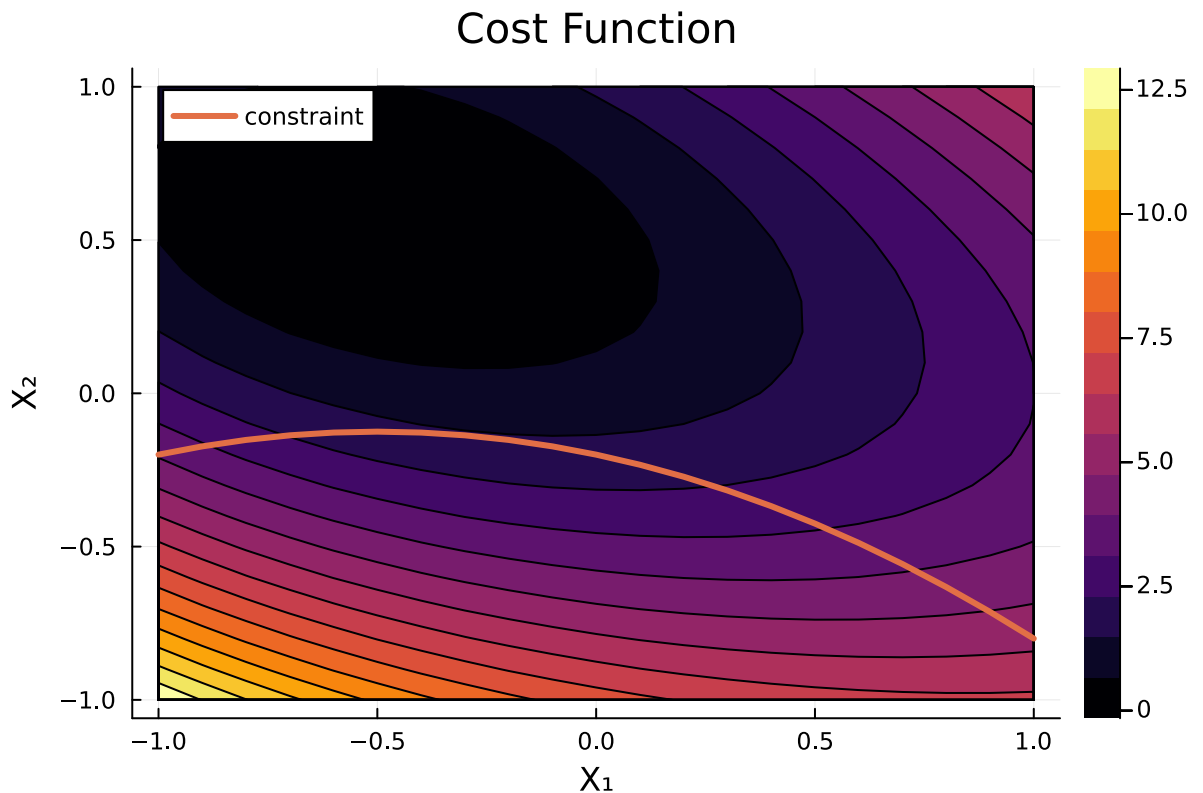
iter: 1      |r|: 0.9995239729818045      α: 1.0
iter: 2      |r|: 0.9421342427117169      α: 0.5
iter: 3      |r|: 0.1753172908866053      α: 1.0
iter: 4      |r|: 0.0018472215879181287    α: 1.0
iter: 5      |r|: 2.1010529101114843e-9    α: 1.0
iter: 6      |r|: 2.5246740534795566e-16    Test Summary: | Pass Total
check Newton |      2      2

```

Test.DefaultTestSet("check Newton", Any[], 2, false, false)

We will now use Newton's method to solve the following constrained optimization problem. We will write functions for the full Newton Jacobian, as well as the Gauss-Newton Jacobian.

```
In [29]: let
          Q = [1.65539  2.89376; 2.89376  6.51521];
          q = [2;-3]
          cost(x) = 0.5*x'*Q*x + q'*x + exp(-1.3*x[1] + 0.3*x[2]^2) # cost function
          contour(-1:.1:1,-1:.1:1, (x1,x2)-> cost([x1;x2]),title = "Cost Function",
                  xlabel = "X1", ylabel = "X2",fill = true)
          plot!(-1:.1:1, -0.3*(-1:.1:1).^2 - 0.3*(-1:.1:1) .- .2,lw = 3,label =
"constraint")
end
```



```

In [67]: # we will use Newton's method to solve the constrained optimization problem shown above
function cost(x::Vector)
    Q = [1.65539 2.89376; 2.89376 6.51521];
    q = [2; -3]
    return 0.5*x'*Q*x + q'*x + exp(-1.3*x[1] + 0.3*x[2]^2)
end

function constraint(x::Vector)
    norm(x) - 0.5
end

# HINT: use this if you want to, but you don't have to
function constraint_jacobian(x::Vector)::Matrix
    # since `constraint` returns a scalar value, ForwardDiff
    # will only allow us to compute a gradient of this function
    # (instead of a Jacobian). This means we have two options for
    # computing the Jacobian: Option 1 is to just reshape the gradient
    # into a row vector

    # J = reshape(FD.gradient(constraint, x), 1, 2)

    # or we can just make the output of constraint an array,
    constraint_array(_x) = [constraint(_x)]
    J = FD.jacobian(constraint_array, x)

    # assert the jacobian has # rows = # outputs
    # and # columns = # inputs
    @assert size(J) == (length(constraint(x)), length(x))

    return J
end

function kkt_conditions(z::Vector)::Vector
    # TODO: return the KKT conditions

    x = z[1:2]
    λ = z[3:3]

    # TODO: return the stationarity condition for the cost function
    # and the primal feasibility
    ℓx = FD.gradient(cost, x) + constraint_jacobian(x)'*λ
    ℓ1 = constraint(x)
    return [ℓx; ℓ1]
end

function fn_kkt_jac(z::Vector)::Matrix
    # TODO: return full Newton Jacobian of kkt conditions wrt z
    x = z[1:2]
    λ = z[3]
    β = 1e-3

    # TODO: return full Newton jacobian with a 1e-3 regularizer
    ∇2f = FD.hessian(cost, x)
    ∂c_∂x = constraint_jacobian(x)
    ∂2ℓ_∂x2 = ∇2f + FD.jacobian(constraint_jacobian, x)*λ

```

```

    ∂²ℓ_∂x² += β*I
    fn_jacobian = [∂²ℓ_∂x² ∂c_∂x'; ∂c_∂x -β*I]
    return fn_jacobian
end

function gn_kkt_jac(z::Vector)::Matrix
    # TODO: return Gauss-Newton Jacobian of kkt conditions wrt z
    x = z[1:2]
    λ = z[3]
    β = 1e-3

    # TODO: return Gauss-Newton jacobian with a 1e-3 regularizer
    ∇²f = FD.hessian(cost, x)
    ∂c_∂x = constraint_jacobian(x)
    ∂²ℓ_∂x² = ∇²f
    ∂²ℓ_∂x² += β*I
    gn_jacobian = [∂²ℓ_∂x² ∂c_∂x'; ∂c_∂x -β*I]
    return gn_jacobian
end

```

gn\_kkt\_jac (generic function with 1 method)

In [68]: @testset "Test Jacobians" begin

```

    # first we check the regularizer
    z = randn(3)
    J_fn = fn_kkt_jac(z)
    J_gn = gn_kkt_jac(z)

    # check what should/shouldn't be the same between
    @test norm(J_fn[1:2,1:2] - J_gn[1:2,1:2]) > 1e-10
    @test abs(J_fn[3,3] + 1e-3) < 1e-10
    @test abs(J_gn[3,3] + 1e-3) < 1e-10
    @test norm(J_fn[1:2,3] - J_gn[1:2,3]) < 1e-10
    @test norm(J_fn[3,1:2] - J_gn[3,1:2]) < 1e-10
end

```

Test Summary:	Pass	Total
Test Jacobians	5	5

Test.DefaultTestSet("Test Jacobians", Any[], 5, false, false)



In [69]: @testset "Full Newton" begin

```
    z0 = [-.1, .5, 0] # initial guess
    merit_fx(_z) = norm(kkt_conditions(_z)) # simple merit function
    Z = newtons_method(z0, kkt_conditions, fn_kkt_jac, merit_fx; tol = 1e-4, max_iters = 100, verbose = true)
    R = kkt_conditions.(Z)

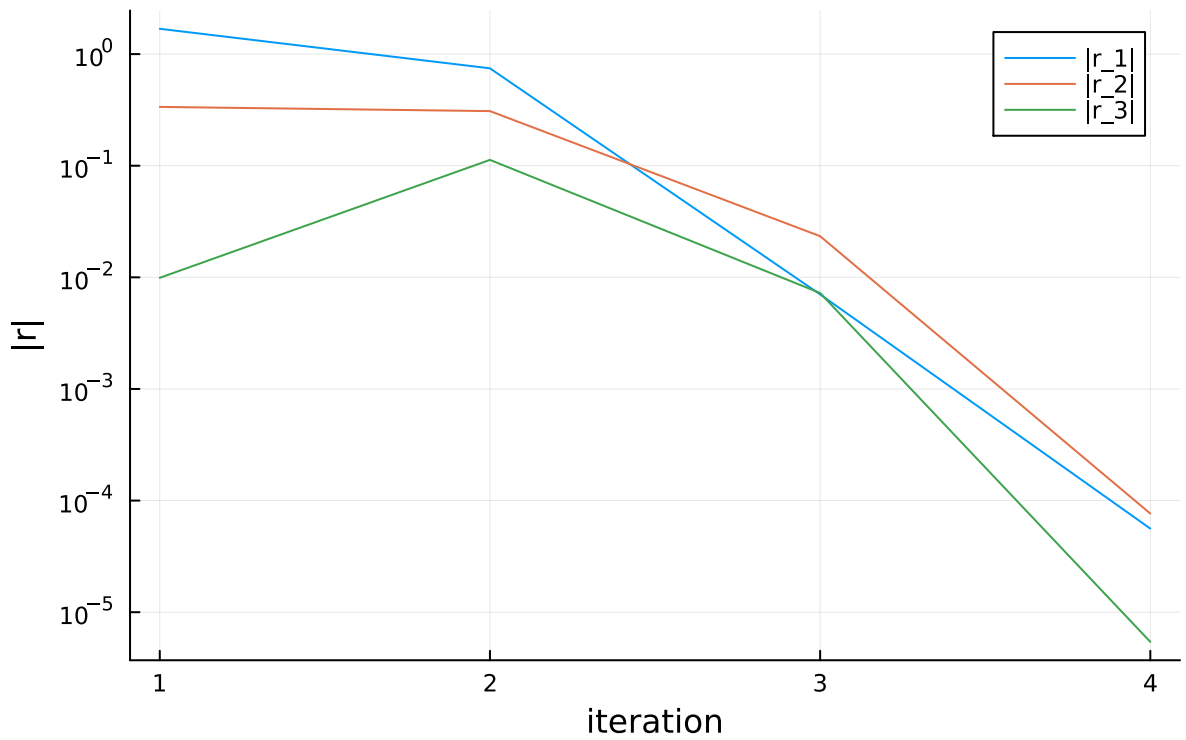
    # make sure we converged on a solution to the KKT conditions
    @test norm(kkt_conditions(Z[end])) < 1e-4
    @test length(R) < 6

    # -----plotting stuff-----
    Rp = [[abs(R[i][ii]) + 1e-15 for i = 1:length(R)] for ii = 1:length(R[1])]
    # this gets abs of each term at each iteration

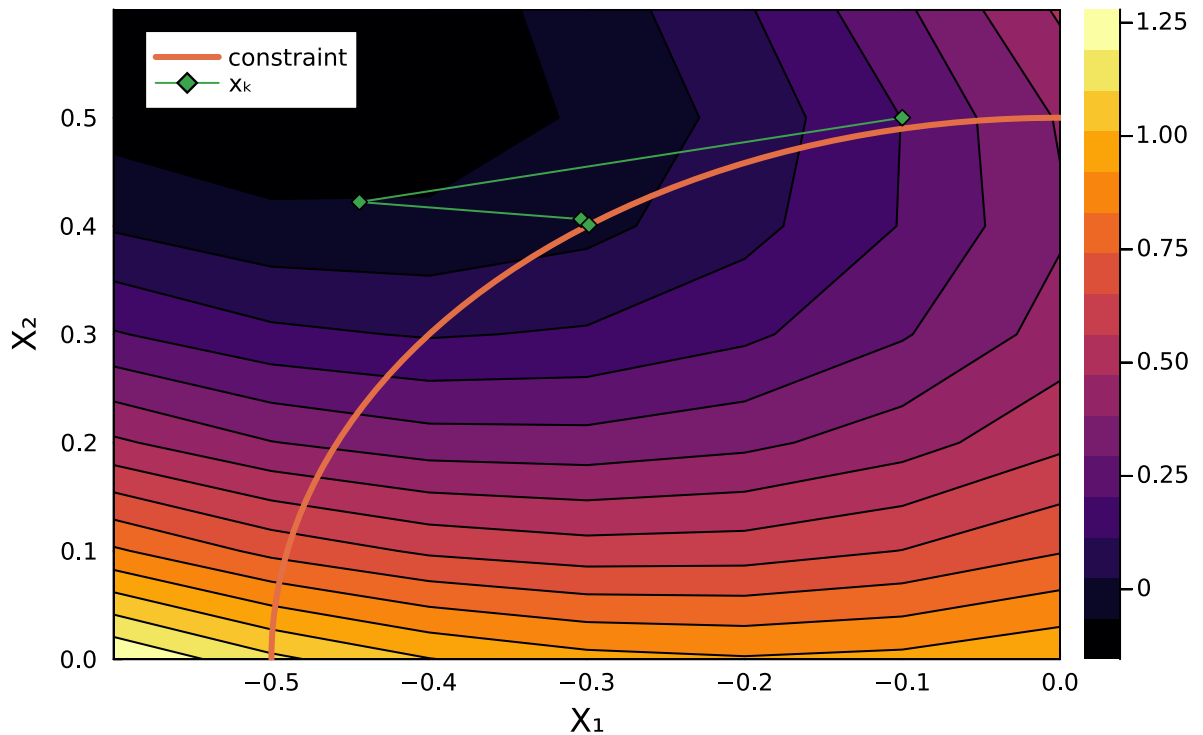
    plot(Rp[1],yaxis=:log,ylabel = "|r|",xlabel = "iteration",
         yticks= [1.0*10.0^(-x) for x = float(15:-1:-2)],
         title = "Convergence of Full Newton on KKT Conditions",label = "|r_1|")
    plot!(Rp[2],label = "|r_2|")
    display(plot!(Rp[3],label = "|r_3|"))

    contour(-.6:.1:0,0:.1:.6, (x1,x2)-> cost([x1;x2]),title = "Cost Function",
            xlabel = "X1", ylabel = "X2",fill = true)
    xcirc = [.5*cos(θ) for θ in range(0, 2*pi, length = 200)]
    ycirc = [.5*sin(θ) for θ in range(0, 2*pi, length = 200)]
    plot!(xcirc,ycirc, lw = 3.0, xlim = (-.6, 0), ylim = (0, .6),label = "constraint")
    z1_hist = [z[1] for z in Z]
    z2_hist = [z[2] for z in Z]
    display(plot!(z1_hist, z2_hist, marker = :d, label = "xk"))
    # -----plotting stuff-----
end
```

## Convergence of Full Newton on KKT Conditions



## Cost Function



```

iter: 1   |r|: 1.7188450769812715   α: 1.0
iter: 2   |r|: 0.8150495962203247   α: 1.0
iter: 3   |r|: 0.025448943695826287  α: 1.0
iter: 4   |r|: 9.501514353500914e-5  Test Summary: | Pass Total
Full Newton |      2      2
    
```

```
Test.DefaultTestSet("Full Newton", Any[], 2, false, false)
```

In [70]: @testset "Gauss-Newton" begin

```
    z0 = [-.1, .5, 0] # initial guess
    merit_fx(z) = norm(kkt_conditions(z)) # simple merit function

    # the only difference in this block vs the previous is `gn_kkt_jac` instead of `fn_kkt_jac`
    Z = newtons_method(z0, kkt_conditions, gn_kkt_jac, merit_fx; tol = 1e-4, max_iters = 100, verbose = true)
    R = kkt_conditions.(Z)

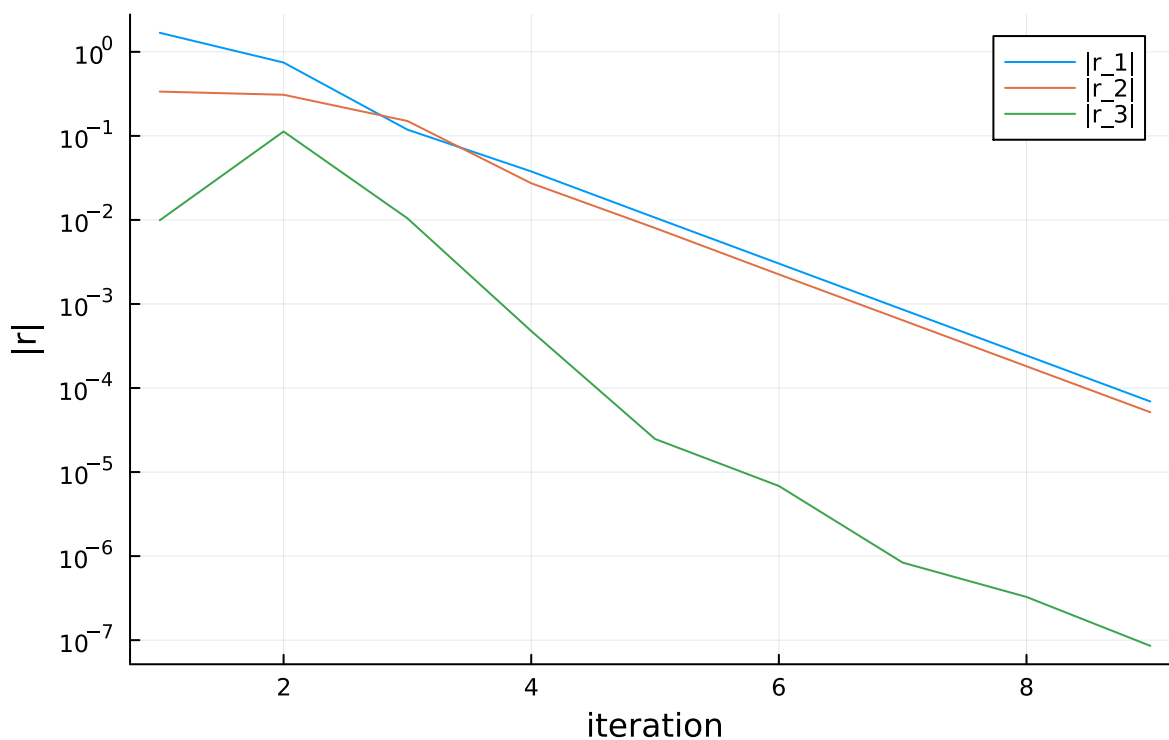
    # make sure we converged on a solution to the KKT conditions
    @test norm(kkt_conditions(Z[end])) < 1e-4
    @test length(R) < 10

    # -----plotting stuff-----
    Rp = [[abs(R[i][ii]) + 1e-15 for i = 1:length(R)] for ii = 1:length(R[1])]
    # this gets abs of each term at each iteration

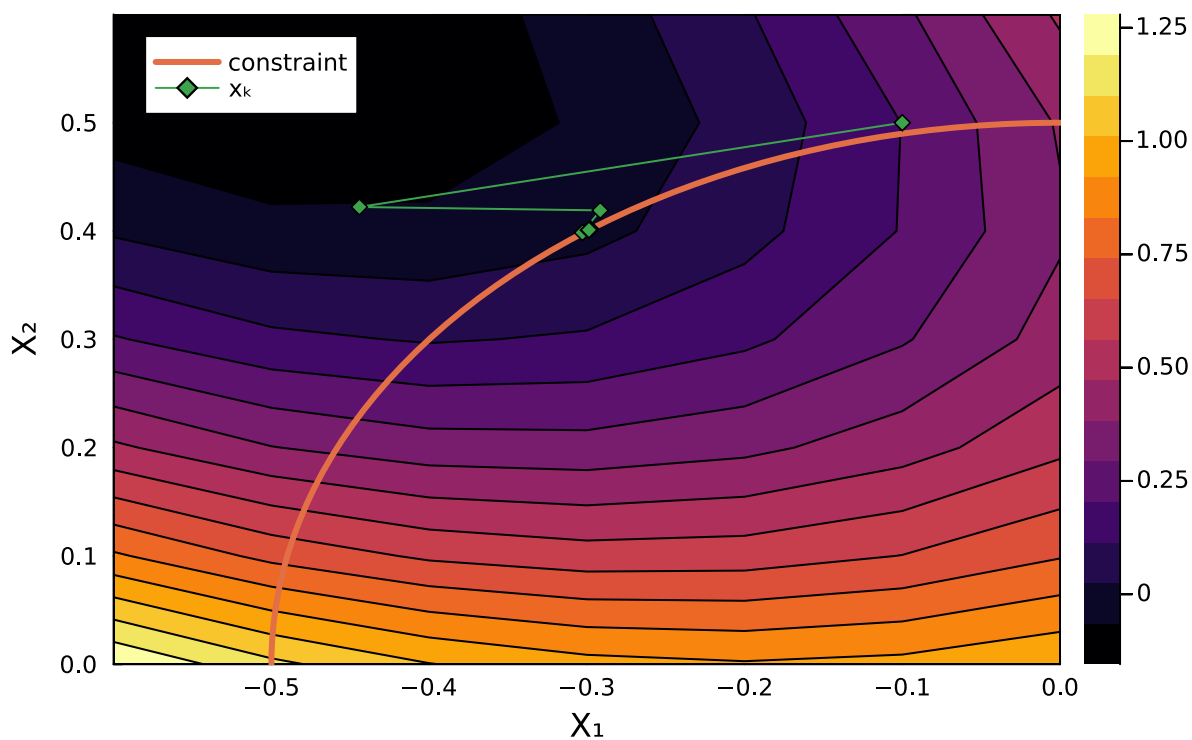
    plot(Rp[1],yaxis=:log,ylabel = "|r|",xlabel = "iteration",
         yticks= [1.0*10.0^(-x) for x = float(15:-1:-2)],
         title = "Convergence of Full Newton on KKT Conditions",label = "|r_1|")
    plot!(Rp[2],label = "|r_2|")
    display(plot!(Rp[3],label = "|r_3|"))

    contour(-.6:.1:0,0:.1:.6, (x1,x2)-> cost([x1;x2]),title = "Cost Function",
            xlabel = "X1", ylabel = "X2",fill = true)
    xcirc = [.5*cos(θ) for θ in range(0, 2*pi, length = 200)]
    ycirc = [.5*sin(θ) for θ in range(0, 2*pi, length = 200)]
    plot!(xcirc,ycirc, lw = 3.0, xlim = (-.6, 0), ylim = (0, .6),label = "constraint")
    z1_hist = [z[1] for z in Z]
    z2_hist = [z[2] for z in Z]
    display(plot!(z1_hist, z2_hist, marker = :d, label = "xk"))
    # -----plotting stuff-----
end
```

## Convergence of Full Newton on KKT Conditions



## Cost Function



```

iter: 1    |r|: 1.7188450769812715    α: 1.0
iter: 2    |r|: 0.8150495962203247    α: 1.0
iter: 3    |r|: 0.19186516708148574    α: 1.0
iter: 4    |r|: 0.04663490553083029    α: 1.0
iter: 5    |r|: 0.01332977842954523    α: 1.0
iter: 6    |r|: 0.0037714013578573355    α: 1.0
iter: 7    |r|: 0.001071165054782875    α: 1.0
iter: 8    |r|: 0.00030392210707413806    α: 1.0
iter: 9    |r|: 8.625764141582568e-5    Test Summary: | Pass Total
Gauss-Newton |      2      2

```

```
Test.DefaultTestSet("Gauss-Newton", Any[], 2, false, false)
```

## Part B (10 pts): Balance a quadruped

Now we are going to solve for the control input  $u \in \mathbb{R}^{12}$ , and state  $x \in \mathbb{R}^{30}$ , such that the quadruped is balancing up on one leg. First, let's load in a model and display the rough "guess" configuration that we are going for:

```
In [72]: include(joinpath(@__DIR__, "quadruped.jl"))

# -----these three are global variables-----
model = UnitreeA1()
mvis = initialize_visualizer(model)
const x_guess = initial_state(model)
# -----

set_configuration!(mvis, x_guess[1:state_dim(model)÷2])
render(mvis)
```

└ Info: MeshCat server started. You can open the visualizer by visiting the following URL in your browser:

| <http://127.0.0.1:8700>

└ @ MeshCat /root/.julia/packages/MeshCat/vWPbP/src/visualizer.jl:73

Now, we are going to solve for the state and control that get us a statically stable stance on just one leg. We are going to do this by solving the following optimization problem:

$$\begin{aligned} \min_{x,u} \quad & \frac{1}{2}(x - x_{guess})^T(x - x_{guess}) + \frac{1}{2}10^{-3}u^T u \\ \text{st} \quad & f(x, u) = 0 \end{aligned}$$

Where our primal variables are  $x \in \mathbb{R}^{30}$  and  $u \in \mathbb{R}^{12}$ , that we can stack up in a new variable  $y = [x^T, u^T]^T \in \mathbb{R}^{42}$ . We have a constraint  $f(x, u) = \dot{x} = 0$ , which will ensure the resulting configuration is stable. This constraint is enforced with a dual variable  $\lambda \in \mathbb{R}^{30}$ . We are now ready to use Newton's method to solve this equality constrained optimization problem, where we will solve for a variable  $z = [y^T, \lambda^T]^T \in \mathbb{R}^{72}$ .

In this next section, you should fill out `quadruped_kkt(z)` with the KKT conditions for this optimization problem, given the constraint is that `dynamics(model, x, u) = zeros(30)`. When forming the Jacobian of the KKT conditions, use the Gauss-Newton approximation for the hessian of the Lagrangian (see example above if you're having trouble with this).

```

In [79]: # initial guess
const x_guess = initial_state(model)

# indexing stuff
const idx_x = 1:30
const idx_u = 31:42
const idx_c = 43:72

# I like stacking up all the primal variables in y, where y = [x;u]
# Newton's method will solve for z = [x;u;λ], or z = [y;λ]

function quadruped_cost(y::Vector)
    # cost function
    @assert length(y) == 42
    x = y[idx_x]
    u = y[idx_u]

    # TODO: return cost
    cost = 1/2*(x-x_guess)'*(x-x_guess) + 1/2*1e-3*u'*u
    return cost
end

function quadruped_constraint(y::Vector)::Vector
    # constraint function
    @assert length(y) == 42
    x = y[idx_x]
    u = y[idx_u]

    # TODO: return constraint
    constraint = dynamics(model,x,u)
    return constraint
end

function quadruped_kkt(z::Vector)::Vector
    @assert length(z) == 72
    x = z[idx_x]
    u = z[idx_u]
    λ = z[idx_c]

    y = [x;u]
    ∂c_∂x = FD.jacobian(quadruped_constraint, y)
    # TODO: return the KKT conditions
    ∇xL = FD.gradient(quadruped_cost, y) + ∂c_∂x'*λ
    ∇lL = quadruped_constraint(y)
    kkt = [∇xL; ∇lL]
    return kkt
end

function quadruped_kkt_jac(z::Vector)::Matrix
    @assert length(z) == 72
    x = z[idx_x]
    u = z[idx_u]
    λ = z[idx_c]

    y = [x;u]
    β = 1e-3

```



```

    # TODO: return Gauss-Newton Jacobian with a regularizer (try 1e-3,1e-4,1e-
5,1e-6)
    # and use whatever regularizer works for you
    ∂c_∂x = FD.jacobian(quadruped_constraint, y)
    Hessian = FD.hessian(quadruped_cost, y)
    kkt_jac = [Hessian+β*I ∂c_∂x'; ∂c_∂x -β*I]
    return kkt_jac
end

```

WARNING: redefinition of constant x\_guess. This may fail, cause incorrect answers, or produce other errors.

quadruped\_kkt\_jac (generic function with 1 method)

```

In [80]: function quadruped_merit(z)
    # merit function for the quadruped problem
    @assert length(z) == 72
    r = quadruped_kkt(z)
    return norm(r[1:42]) + 1e4*norm(r[43:end])
end

@testset "quadruped standing" begin

    z0 = [x_guess; zeros(12); zeros(30)]
    Z = newtons_method(z0, quadruped_kkt, quadruped_kkt_jac, quadruped_merit;
    tol = 1e-6, verbose = true, max_iters = 50)
    set_configuration!(mvis, Z[end][1:state_dim(model)÷2])
    R = norm.(quadruped_kkt.(Z))

    display(plot(1:length(R), R, yaxis=:log, xlabel = "iteration", ylabel = "|r
|"))

    @test R[end] < 1e-6
    @test length(Z) < 25

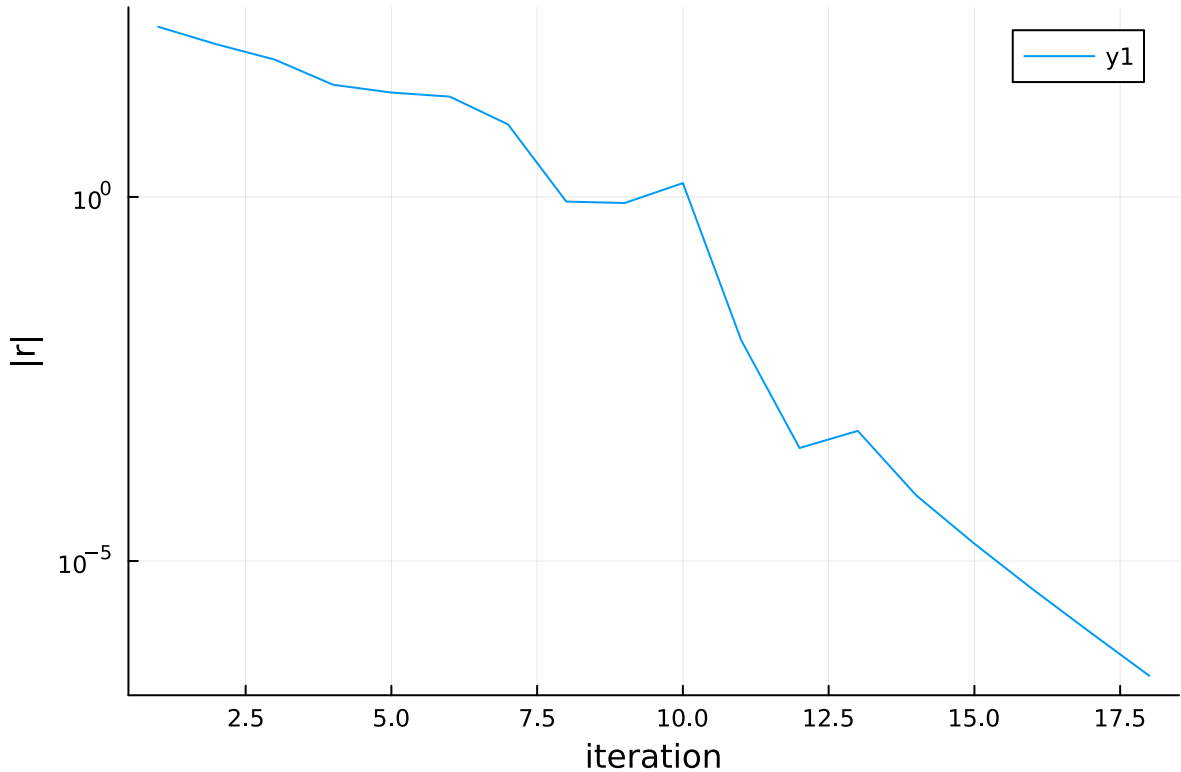
    x,u = Z[end][idx_x], Z[end][idx_u]

    @test norm(dynamics(model, x, u)) < 1e-6

end

```

```
iter: 1 |r|: 217.3723687233216  α: 1.0
iter: 2 |r|: 124.92133581597646  α: 1.0
iter: 3 |r|: 76.87596686967504  α: 0.5
iter: 4 |r|: 34.75020218490619  α: 0.25
iter: 5 |r|: 27.139783671699536  α: 0.5
iter: 6 |r|: 23.87618772969423  α: 1.0
iter: 7 |r|: 9.928511516366882  α: 1.0
iter: 8 |r|: 0.863583108614276  α: 1.0
iter: 9 |r|: 0.8252015646562465  α: 1.0
iter: 10 |r|: 1.5494640418654932  α: 1.0
iter: 11 |r|: 0.010794824539859554  α: 1.0
iter: 12 |r|: 0.00035696647618670515  α: 1.0
iter: 13 |r|: 0.0006131222627905237  α: 1.0
iter: 14 |r|: 8.012756350545612e-5  α: 1.0
```



```
iter: 15 |r|: 1.7291198428945714e-5  α: 1.0
iter: 16 |r|: 4.0962861452913235e-6  α: 1.0
iter: 17 |r|: 1.030182637711404e-6  α: 1.0
iter: 18 |r|: 2.65599358930913e-7  Test Summary: | Pass Total
quadruped standing | 3 3
```

Test.DefaultTestSet("quadruped standing", Any[], 3, false, false)

In [82]: **let**

```
# let's visualize the balancing position we found

z0 = [x_guess; zeros(12); zeros(30)]
Z = newtons_method(z0, quadruped_kkt, quadruped_kkt_jac, quadruped_merit;
tol = 1e-6, verbose = false, max_iters = 50)
# visualizer
mvis = initialize_visualizer(model)
set_configuration!(mvis, Z[end][1:state_dim(model)÷2])
render(mvis)

end
```

```
└ Info: MeshCat server started. You can open the visualizer by visiting the following URL in your browser:
  | http://127.0.0.1:8702
  └ @ MeshCat /root/.julia/packages/MeshCat/vWPbP/src/visualizer.jl:73
```

## Part C (5 pts): One sentence short answer

1. Why do we use a linesearch?

**To ensure that the current newton step takes us to a value lower than current value (ensure descent)**

1. Do we need a linesearch for both convex and nonconvex problems?

**Yes when for nonconvex and yes for convex when there is a constraint present. linesearch helps ensure newton results are close enough to the constraint**

1. Name one case where we absolutely do not need a linesearch.

**Strongly convex problems without constraint**

```
In [1]: import Pkg
Pkg.activate(@__DIR__)
Pkg.instantiate()
using LinearAlgebra, Plots
import ForwardDiff as FD
using Printf
using JLD2
```

Activating environment at `/home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1\_S24/Project.toml`

## Q2 (30 pts): Augmented Lagrangian Quadratic Program Solver

### Part (A): QP Solver (10 pts)

Here we are going to use the augmented lagrangian method described [here in a video](https://www.youtube.com/watch?v=0x0JD5uO_ZQ) ([https://www.youtube.com/watch?v=0x0JD5uO\\_ZQ](https://www.youtube.com/watch?v=0x0JD5uO_ZQ)), with [the corresponding pdf here](https://github.com/Optimal-Control-16-745/lecture-notebooks-2022/blob/main/misc/AL_tutorial.pdf) ([https://github.com/Optimal-Control-16-745/lecture-notebooks-2022/blob/main/misc/AL\\_tutorial.pdf](https://github.com/Optimal-Control-16-745/lecture-notebooks-2022/blob/main/misc/AL_tutorial.pdf)) to solve the following problem:

$$\begin{aligned} \min_x \quad & \frac{1}{2}x^T Qx + q^T x \\ \text{s.t.} \quad & Ax - b = 0 \\ & Gx - h \leq 0 \end{aligned}$$

where the cost function is described by  $Q \in \mathbb{R}^{n \times n}$ ,  $q \in \mathbb{R}^n$ , an equality constraint is described by  $A \in \mathbb{R}^{m \times n}$  and  $b \in \mathbb{R}^m$ , and an inequality constraint is described by  $G \in \mathbb{R}^{p \times n}$  and  $h \in \mathbb{R}^p$ .

By introducing a dual variable  $\lambda \in \mathbb{R}^m$  for the equality constraint, and  $\mu \in \mathbb{R}^p$  for the inequality constraint, we have the following KKT conditions for optimality:

$$\begin{aligned} Qx + q + A^T \lambda + G^T \mu &= 0 && \text{stationarity} \\ Ax - b &= 0 && \text{primal feasibility} \\ Gx - h &\leq 0 && \text{primal feasibility} \\ \mu &\geq 0 && \text{dual feasibility} \\ \mu \odot (Gx - h) &= 0 && \text{complementarity} \end{aligned}$$

where  $\odot$  is element-wise multiplication.

```

In [2]: # TODO: read below
# NOTE: DO NOT USE A WHILE LOOP ANYWHERE
"""
The data for the QP is stored in `qp` the following way:
    @load joinpath(@__DIR__, "qp_data.jld2") qp

which is a NamedTuple, where
    Q, q, A, b, G, h = qp.Q, qp.q, qp.A, qp.b, qp.G, qp.h

contains all of the problem data you will need for the QP.

Your job is to make the following function

    x, λ, μ = solve_qp(qp; verbose = true, max_iters = 100, tol = 1e-8)

You can use (or not use) any of the additional functions:

as long as solve_qp works.
"""
function cost(qp::NamedTuple, x::Vector)::Real
    0.5*x'*qp.Q*x + dot(qp.q,x)
end

function c_eq(qp::NamedTuple, x::Vector)::Vector
    qp.A*x - qp.b
end

function h_ineq(qp::NamedTuple, x::Vector)::Vector
    qp.G*x - qp.h
end

function lagrangian(qp::NamedTuple, x::Vector, λ::Vector, μ::Vector)::Real
    cost(qp,x) + λ'*c_eq(qp,x) + μ'*h_ineq(qp,x)
end

function mask_matrix(qp::NamedTuple, x::Vector, μ::Vector, ρ::Real)::Matrix
    M = h_ineq(qp,x)
    I_ρ = 1.0*I(length(M))
    for ii = 1:length(M)
        if M[ii]<0 && μ[ii]==0
            I_ρ[ii,ii]=0
        else
            I_ρ[ii,ii]=ρ
        end
    end
    return I_ρ
end

function augmented_lagrangian(qp::NamedTuple, x::Vector, λ::Vector, μ::Vector,
    ρ::Real)::Real
    lagrangian(qp,x,λ,μ) + ρ/2*c_eq(qp,x)'*c_eq(qp,x) + 1/2*h_ineq(qp,x)'*mask_
    _matrix(qp,x,μ,ρ)*h_ineq(qp,x)
end

function logging(qp::NamedTuple, main_iter::Int, AL_gradient::Vector, x::Vecto
    r, λ::Vector, μ::Vector, ρ::Real)

```

```

# TODO: stationarity norm
stationarity_norm = norm(FD.gradient(_x -> lagrangian(qp,_x,λ,μ),x))
@printf("%3d % 7.2e % 7.2e % 7.2e % 7.2e % 7.2e %5.0e\n",
        main_iter, stationarity_norm, norm(AL_gradient), maximum(h_ineq(qp,
x)),
        norm(c_eq(qp,x),Inf), abs(dot(μ,h_ineq(qp,x))), ρ)
end

function solve_qp(qp; verbose = true, max_iters = 100, tol = 1e-8)
    x = zeros(length(qp.q))
    λ = zeros(length(qp.b))
    μ = zeros(length(qp.h))
    ρ = 1
    φ = 2
    if verbose
        @printf "iter    |∇Lx|    |∇ALx|    max(h)    |c|    compl
ρ\n"
        @printf "-----\n"
    end

    kkt(_x) = FD.gradient(__x -> augmented_lagrangian(qp,__x,λ,μ,ρ), _x)

    # TODO:
    for main_iter = 1:max_iters
        if verbose
            logging(qp, main_iter, kkt(x), x, λ, μ, ρ)
        end

        # NOTE: when you do your dual update for μ, you should compute
        # your element-wise maximum with `max.(a,b)`, not `max(a,b)`
        # TODO: convergence criteria based on tol
        if norm(kkt(x)) < tol
            return x, λ, μ
        end

        Δx = -(FD.jacobian(_x -> kkt(_x),x)) \ kkt(x)
        x = x + Δx
        λ += ρ*c_eq(qp,x)
        μ = max.(0,μ+ρ*h_ineq(qp,x))
        ρ *= φ
    end

    error("qp solver did not converge")
end

let
    # example solving qp
    @load joinpath(@__DIR__, "qp_data.jld2") qp
    x, λ, μ = solve_qp(qp; verbose = true, tol = 1e-8)
end

```



iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
1	2.98e+01	5.60e+01	4.38e+00	6.49e+00	0.00e+00	1e+00
2	4.83e+00	1.83e+01	1.55e+00	1.31e+00	2.64e+00	2e+00
3	7.00e-01	8.70e+00	4.97e-02	6.01e-01	3.12e-01	4e+00
4	2.39e-01	2.24e+00	3.78e-02	8.34e-02	4.04e-02	8e+00
5	1.76e+00	5.20e+00	7.09e-02	5.52e-03	3.69e-02	2e+01
6	4.51e-14	3.32e+00	1.56e-03	2.71e-03	5.22e-06	3e+01
7	4.39e-14	9.80e-02	-2.16e-04	3.36e-04	2.46e-04	6e+01
8	2.17e-13	4.77e-03	-5.77e-06	1.25e-05	6.39e-06	1e+02
9	3.29e-13	1.42e-04	-8.10e-08	1.94e-07	8.92e-08	3e+02
10	5.50e-13	2.18e-06	-6.05e-10	1.48e-09	6.65e-10	5e+02
11	2.49e-12	1.70e-08	-2.31e-12	5.70e-12	2.55e-12	1e+03
12	2.71e-12	6.09e-11	-4.44e-15	1.11e-14	5.07e-15	2e+03

```
([-0.326230805713393, 0.24943797997175676, -0.43226766440522546, -1.417224697
1242008, -1.3994527400875794, 0.6099582408523462, -0.07312202122168004, 1.303
1477522000228, 0.5389034791065959, -0.7225813651685241], [-0.1283519512348898
5, -2.8376241672114153, -0.8320804499660779], [0.03635294263949618, 0.0, 0.0,
1.0594444951137387, 0.0])
```

## QP Solver test

```
In [3]: # 10 points
using Test
@testset "qp solver" begin
    @load joinpath(@__DIR__, "qp_data.jld2") qp
    x, λ, μ = solve_qp(qp; verbose = true, max_iters = 100, tol = 1e-6)

    @load joinpath(@__DIR__, "qp_solutions.jld2") qp_solutions
    @test norm(x - qp_solutions.x, Inf) < 1e-3;
    @test norm(λ - qp_solutions.λ, Inf) < 1e-3;
    @test norm(μ - qp_solutions.μ, Inf) < 1e-3;
end
```

iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
1	2.98e+01	5.60e+01	4.38e+00	6.49e+00	0.00e+00	1e+00
2	4.83e+00	1.83e+01	1.55e+00	1.31e+00	2.64e+00	2e+00
3	7.00e-01	8.70e+00	4.97e-02	6.01e-01	3.12e-01	4e+00
4	2.39e-01	2.24e+00	3.78e-02	8.34e-02	4.04e-02	8e+00
5	1.76e+00	5.20e+00	7.09e-02	5.52e-03	3.69e-02	2e+01
6	4.51e-14	3.32e+00	1.56e-03	2.71e-03	5.22e-06	3e+01
7	4.39e-14	9.80e-02	-2.16e-04	3.36e-04	2.46e-04	6e+01
8	2.17e-13	4.77e-03	-5.77e-06	1.25e-05	6.39e-06	1e+02
9	3.29e-13	1.42e-04	-8.10e-08	1.94e-07	8.92e-08	3e+02
10	5.50e-13	2.18e-06	-6.05e-10	1.48e-09	6.65e-10	5e+02
11	2.49e-12	1.70e-08	-2.31e-12	5.70e-12	2.55e-12	1e+03

```
Test Summary: | Pass Total
qp solver    |    3    3
```

```
Test.DefaultTestSet("qp solver", Any[], 3, false, false)
```

# Simulating a Falling Brick with QPs

In this question we'll be simulating a brick falling and sliding on ice in 2D. You will show that this problem can be formulated as a QP, which you will solve using an Augmented Lagrangian method.

## The Dynamics

The dynamics of the brick can be written in continuous time as

$$M\dot{v} + Mg = J^T \mu$$

$$\text{where } M = mI_{2 \times 2}, \quad g = \begin{bmatrix} 0 \\ 9.81 \end{bmatrix}, \quad J = \begin{bmatrix} 0 & 1 \end{bmatrix}$$

and  $\mu \in \mathbb{R}$  is the normal force. The velocity  $v \in \mathbb{R}^2$  and position  $q \in \mathbb{R}^2$  are composed of the horizontal and vertical components.

We can discretize the dynamics with backward Euler: 
$$\begin{bmatrix} v_{k+1} \\ q_{k+1} \end{bmatrix} = \begin{bmatrix} v_k \\ q_k \end{bmatrix} + \Delta t \cdot \begin{bmatrix} \frac{1}{m} J^T \mu_{k+1} - g \\ v_{k+1} \end{bmatrix}$$

- $\Delta t$

$$\begin{bmatrix} \frac{1}{m} J^T \mu_{k+1} - g \\ v_{k+1} \end{bmatrix}$$

\$\$

We also have the following contact constraints:

$$\begin{aligned} Jq_{k+1} &\geq 0 && \text{(don't fall through the ice)} \\ \mu_{k+1} &\geq 0 && \text{(normal forces only push, not pull)} \\ \mu_{k+1} Jq_{k+1} &= 0 && \text{(no force at a distance)} \end{aligned}$$

## Part (B): QP formulation for Falling Brick (5 pts)

Show that these discrete-time dynamics are equivalent to the following QP by writing down the KKT conditions.

$$\begin{aligned} \text{minimize}_{v_{k+1}} \quad & \frac{1}{2} v_{k+1}^T M v_{k+1} + [M(\Delta t \cdot g - v_k)]^T v_{k+1} \\ \text{subject to} \quad & -J(q_k + \Delta t \cdot v_{k+1}) \leq 0 \end{aligned}$$

**TASK:** Write down the KKT conditions for the optimization problem above, and show that it's equivalent to the dynamics problem stated previously. Use LaTeX markdown.

**PUT ANSWER HERE:**

KKT:

$$\begin{aligned}
 M v_{k+1} + M(\Delta t g - v_k) - \Delta t J^T \mu_{k+1} &= 0 \\
 M v_{k+1} - M v_k &= \Delta t [J^T \mu_{k+1} - M g] \\
 v_{k+1} &= v_k + \Delta t \left[ \frac{1}{m} J^T \mu_{k+1} - g \right] \\
 q_{k+1} &= q_k + \Delta t v_{k+1} \\
 -J(q_k + \Delta t v_{k+1}) \mu_{k+1} &\leq 0 \\
 J q_{k+1} \mu_{k+1} &\geq 0 \\
 \mu_{k+1} &\geq 0 \\
 \mu_{k+1} \odot -J(q_k + \Delta t v_{k+1}) &= 0 \\
 \mu_{k+1} J q_{k+1} &= 0
 \end{aligned}$$

## Part (C): Brick Simulation (5 pts)

```

In [4]: function brick_simulation_qp(q, v; mass = 1.0, Δt = 0.01)

    # TODO: fill in the QP problem data for a simulation step
    # fill in Q, q, G, h, but leave A, b the same
    # this is because there are no equality constraints in this qp

    g = [0, 9.81]
    J = [0 1]

    qp = (
        Q = Matrix{Float64}(mass * I(2)),
        q = Matrix{Float64}(mass * I(2)) * (Δt * g - v),
        A = zeros{Float64}(0, 2), # don't edit this
        b = zeros{Float64}(0),    # don't edit this
        G = -Δt * J,
        h = J * q
    )

    return qp
end

```

brick\_simulation\_qp (generic function with 1 method)

In [5]: @testset "brick qp" begin

```
q = [1,3.0]
v = [2,-3.0]

qp = brick_simulation_qp(q,v)
@show typeof(qp.Q)
# check all the types to make sure they're right
qp.Q::Matrix{Float64}
qp.q::Vector{Float64}
qp.A::Matrix{Float64}
qp.b::Vector{Float64}
qp.G::Matrix{Float64}
qp.h::Vector{Float64}

@test size(qp.Q) == (2,2)
@test size(qp.q) == (2,)
@test size(qp.A) == (0,2)
@test size(qp.b) == (0,)
@test size(qp.G) == (1,2)
@test size(qp.h) == (1,)

@test abs(tr(qp.Q) - 2) < 1e-10
@test norm(qp.q - [-2.0, 3.0981]) < 1e-10
@test norm(qp.G - [0 -.01]) < 1e-10
@test abs(qp.h[1] -3) < 1e-10
```

end

typeof(qp.Q) = Matrix{Float64}

Test Summary: | Pass Total

brick qp | 10 10

Test.DefaultTestSet("brick qp", Any[], 10, false, false)

```

In [6]: include(joinpath(@__DIR__, "animate_brick.jl"))
let

    dt = 0.01
    T = 3.0

    t_vec = 0:dt:T
    N = length(t_vec)

    qs = [zeros(2) for i = 1:N]
    vs = [zeros(2) for i = 1:N]

    qs[1] = [0, 1.0]
    vs[1] = [1, 4.5]

    # TODO: simulate the brick by forming and solving a qp
    # at each timestep. Your QP should solve for vs[k+1], and
    # you should use this to update qs[k+1]
    for ii = 2:N
        qp = brick_simulation_qp(qs[ii-1], vs[ii-1]; Δt=dt)
        vs[ii], λ, μ = solve_qp(qp; verbose = true, max_iters = 100, tol = 1e-
6)
        qs[ii] = qs[ii-1] + dt * vs[ii]
    end

    xs = [q[1] for q in qs]
    ys = [q[2] for q in qs]

    @show @test abs(maximum(ys) - 2) < 1e-1
    @show @test minimum(ys) > -1e-2
    @show @test abs(xs[end] - 3) < 1e-2

    xdot = diff(xs)/dt
    @show @test maximum(xdot) < 1.0001
    @show @test minimum(xdot) > 0.9999
    @show @test ys[110] > 1e-2
    @show @test abs(ys[111]) < 1e-2
    @show @test abs(ys[112]) < 1e-2

    display(plot(xs, ys, ylabel = "y (m)", xlabel = "x (m)"))

    animate_brick(qs)
end

```

iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	4.51e+00	4.51e+00	-1.00e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.04e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	4.42e+00	4.42e+00	-1.04e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.09e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	4.32e+00	4.32e+00	-1.09e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.13e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	4.23e+00	4.23e+00	-1.13e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.17e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	4.13e+00	4.13e+00	-1.17e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.21e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	4.04e+00	4.04e+00	-1.21e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.25e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	3.94e+00	3.94e+00	-1.25e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.29e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	3.85e+00	3.85e+00	-1.29e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.32e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	3.75e+00	3.75e+00	-1.32e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.36e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	3.66e+00	3.66e+00	-1.36e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.40e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	3.56e+00	3.56e+00	-1.40e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.43e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	3.47e+00	3.47e+00	-1.43e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.46e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	3.38e+00	3.38e+00	-1.46e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.50e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
-----						
1	3.28e+00	3.28e+00	-1.50e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.53e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$

1	3.19e+00	3.19e+00	-1.53e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.56e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.10e+00	3.10e+00	-1.56e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.59e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.00e+00	3.00e+00	-1.59e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.61e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.91e+00	2.91e+00	-1.61e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.64e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.82e+00	2.82e+00	-1.64e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.67e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.73e+00	2.73e+00	-1.67e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.69e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.64e+00	2.64e+00	-1.69e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.72e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.55e+00	2.55e+00	-1.72e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.74e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.46e+00	2.46e+00	-1.74e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.76e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.37e+00	2.37e+00	-1.76e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.79e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.28e+00	2.28e+00	-1.79e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.81e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.19e+00	2.19e+00	-1.81e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.83e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.10e+00	2.10e+00	-1.83e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.84e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.02e+00	2.02e+00	-1.84e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.86e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

1	1.93e+00	1.93e+00	-1.86e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.88e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.85e+00	1.85e+00	-1.88e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.89e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.77e+00	1.77e+00	-1.89e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.91e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.69e+00	1.69e+00	-1.91e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.92e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.61e+00	1.61e+00	-1.92e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.93e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.54e+00	1.54e+00	-1.93e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.95e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.46e+00	1.46e+00	-1.95e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.96e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.39e+00	1.39e+00	-1.96e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.97e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.33e+00	1.33e+00	-1.97e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.98e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.26e+00	1.26e+00	-1.98e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.98e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.21e+00	1.21e+00	-1.98e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.99e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.15e+00	1.15e+00	-1.99e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.00e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.11e+00	1.11e+00	-2.00e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.00e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.07e+00	1.07e+00	-2.00e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.00e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	c	compl	$\rho$
-----						
1	1.04e+00	1.04e+00	-2.00e+00	0.00e+00	0.00e+00	1e+00



2 iter	0.00e+00   $\nabla L_x$	0.00e+00   $\nabla AL_x$	-2.01e+00 max(h)	0.00e+00  c	0.00e+00 compl	2e+00 $\rho$
1	1.02e+00	1.02e+00	-2.01e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.01e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.00e+00	1.00e+00	-2.01e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.01e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.00e+00	1.00e+00	-2.01e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.01e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.01e+00	1.01e+00	-2.01e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.01e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.02e+00	1.02e+00	-2.01e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.01e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.05e+00	1.05e+00	-2.01e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.00e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.08e+00	1.08e+00	-2.00e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.00e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.12e+00	1.12e+00	-2.00e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.99e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.17e+00	1.17e+00	-1.99e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.99e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.22e+00	1.22e+00	-1.99e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.98e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.28e+00	1.28e+00	-1.98e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.97e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.34e+00	1.34e+00	-1.97e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.96e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.41e+00	1.41e+00	-1.96e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.95e+00	0.00e+00	0.00e+00	2e+00
iter	$\nabla L_x$	$\nabla AL_x$	max(h)	c	compl	$\rho$
1	1.48e+00	1.48e+00	-1.95e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.94e+00	0.00e+00	0.00e+00	2e+00

iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	1.55e+00	1.55e+00	-1.94e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.93e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	1.63e+00	1.63e+00	-1.93e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.92e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	1.71e+00	1.71e+00	-1.92e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.90e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	1.79e+00	1.79e+00	-1.90e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.89e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	1.87e+00	1.87e+00	-1.89e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.87e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	1.96e+00	1.96e+00	-1.87e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.86e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	2.04e+00	2.04e+00	-1.86e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.84e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	2.13e+00	2.13e+00	-1.84e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.82e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	2.21e+00	2.21e+00	-1.82e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.80e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	2.30e+00	2.30e+00	-1.80e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.78e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	2.39e+00	2.39e+00	-1.78e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.76e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	2.48e+00	2.48e+00	-1.76e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.74e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	2.57e+00	2.57e+00	-1.74e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.71e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$
1	2.66e+00	2.66e+00	-1.71e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.69e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	c	compl	$\rho$

1	2.75e+00	2.75e+00	-1.69e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.66e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.84e+00	2.84e+00	-1.66e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.64e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	2.94e+00	2.94e+00	-1.64e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.61e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.03e+00	3.03e+00	-1.61e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.58e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.12e+00	3.12e+00	-1.58e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.55e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.21e+00	3.21e+00	-1.55e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.52e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.31e+00	3.31e+00	-1.52e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.49e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.40e+00	3.40e+00	-1.49e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.46e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.49e+00	3.49e+00	-1.46e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.42e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.59e+00	3.59e+00	-1.42e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.39e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.68e+00	3.68e+00	-1.39e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.35e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.78e+00	3.78e+00	-1.35e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.32e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.87e+00	3.87e+00	-1.32e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.28e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
1	3.97e+00	3.97e+00	-1.28e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.24e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

1	4.06e+00	4.06e+00	-1.24e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.20e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	4.16e+00	4.16e+00	-1.20e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.16e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	4.25e+00	4.25e+00	-1.16e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.12e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	4.35e+00	4.35e+00	-1.12e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.08e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	4.44e+00	4.44e+00	-1.08e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.03e+00	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	4.54e+00	4.54e+00	-1.03e+00	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-9.89e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	4.63e+00	4.63e+00	-9.89e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-9.43e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	4.73e+00	4.73e+00	-9.43e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-8.97e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	4.83e+00	4.83e+00	-8.97e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-8.50e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	4.92e+00	4.92e+00	-8.50e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-8.02e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.02e+00	5.02e+00	-8.02e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-7.52e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.11e+00	5.11e+00	-7.52e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-7.02e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.21e+00	5.21e+00	-7.02e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-6.51e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.31e+00	5.31e+00	-6.51e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-5.99e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.40e+00	5.40e+00	-5.99e-01	0.00e+00	0.00e+00	1e+00

2	0.00e+00	0.00e+00	-5.46e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.50e+00	5.50e+00	-5.46e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-4.92e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.60e+00	5.60e+00	-4.92e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-4.37e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.69e+00	5.69e+00	-4.37e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-3.81e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.79e+00	5.79e+00	-3.81e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-3.24e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.89e+00	5.89e+00	-3.24e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.66e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	5.98e+00	5.98e+00	-2.66e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.07e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	6.08e+00	6.08e+00	-2.07e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-1.47e-01	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	6.18e+00	6.18e+00	-1.47e-01	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-8.58e-02	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	6.27e+00	6.27e+00	-8.58e-02	0.00e+00	0.00e+00	1e+00
2	0.00e+00	0.00e+00	-2.39e-02	0.00e+00	0.00e+00	2e+00
iter	$ \nabla L_x $	$ \nabla A L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	6.37e+00	6.37e+00	-2.39e-02	0.00e+00	0.00e+00	1e+00
2	3.90e-04	1.17e-03	3.90e-02	0.00e+00	1.52e-03	2e+00
3	2.56e-17	1.56e-03	3.90e-02	0.00e+00	4.56e-03	4e+00
4	3.31e-16	3.12e-03	3.90e-02	0.00e+00	1.06e-02	8e+00
5	3.55e-16	6.23e-03	3.89e-02	0.00e+00	2.28e-02	2e+01
6	2.13e-16	1.24e-02	3.89e-02	0.00e+00	4.69e-02	3e+01
7	1.08e-16	2.48e-02	3.88e-02	0.00e+00	9.48e-02	6e+01
8	2.15e-16	4.93e-02	3.85e-02	0.00e+00	1.89e-01	1e+02
9	3.61e-16	9.73e-02	3.80e-02	0.00e+00	3.72e-01	3e+02
10	2.22e-16	1.90e-01	3.71e-02	0.00e+00	7.15e-01	5e+02
11	2.22e-16	3.61e-01	3.53e-02	0.00e+00	1.32e+00	1e+03
12	4.44e-16	6.55e-01	3.20e-02	0.00e+00	2.24e+00	2e+03
13	4.44e-16	1.09e+00	2.66e-02	0.00e+00	3.31e+00	4e+03
14	4.44e-16	1.54e+00	1.88e-02	0.00e+00	3.80e+00	8e+03
15	8.88e-16	1.70e+00	1.04e-02	0.00e+00	2.97e+00	2e+04
16	8.88e-16	1.29e+00	3.93e-03	0.00e+00	1.38e+00	3e+04
17	8.88e-16	6.01e-01	9.18e-04	0.00e+00	3.50e-01	7e+04
18	0.00e+00	1.59e-01	1.22e-04	0.00e+00	4.72e-02	1e+05

19	4.44e-16	2.26e-02	8.61e-06	0.00e+00	3.36e-03	3e+05
20	8.88e-16	1.66e-03	3.16e-07	0.00e+00	1.23e-04	5e+05
21	6.66e-15	6.21e-05	5.92e-09	0.00e+00	2.31e-06	1e+06
22	1.78e-15	1.17e-06	5.60e-11	0.00e+00	2.18e-08	2e+06
23	4.71e-14	1.11e-08	2.66e-13	0.00e+00	1.04e-10	4e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	2.68e+00	2.68e+00	2.66e-13	0.00e+00	0.00e+00	1e+00
2	1.00e-16	4.98e-04	2.49e-02	0.00e+00	6.19e-04	2e+00
3	3.24e-17	9.95e-04	2.49e-02	0.00e+00	1.86e-03	4e+00
4	1.01e-16	1.99e-03	2.49e-02	0.00e+00	4.33e-03	8e+00
5	9.41e-17	3.98e-03	2.48e-02	0.00e+00	9.27e-03	2e+01
6	1.15e-16	7.94e-03	2.48e-02	0.00e+00	1.91e-02	3e+01
7	1.84e-16	1.58e-02	2.47e-02	0.00e+00	3.86e-02	6e+01
8	1.60e-16	3.15e-02	2.46e-02	0.00e+00	7.70e-02	1e+02
9	1.25e-16	6.21e-02	2.43e-02	0.00e+00	1.51e-01	3e+02
10	2.22e-16	1.21e-01	2.37e-02	0.00e+00	2.91e-01	5e+02
11	2.22e-16	2.30e-01	2.25e-02	0.00e+00	5.36e-01	1e+03
12	5.55e-17	4.18e-01	2.04e-02	0.00e+00	9.13e-01	2e+03
13	1.11e-16	6.94e-01	1.69e-02	0.00e+00	1.35e+00	4e+03
14	2.22e-16	9.85e-01	1.20e-02	0.00e+00	1.55e+00	8e+03
15	2.22e-16	1.08e+00	6.61e-03	0.00e+00	1.21e+00	2e+04
16	0.00e+00	8.21e-01	2.50e-03	0.00e+00	5.61e-01	3e+04
17	0.00e+00	3.84e-01	5.86e-04	0.00e+00	1.42e-01	7e+04
18	0.00e+00	1.02e-01	7.75e-05	0.00e+00	1.92e-02	1e+05
19	0.00e+00	1.44e-02	5.50e-06	0.00e+00	1.37e-03	3e+05
20	0.00e+00	1.06e-03	2.02e-07	0.00e+00	5.02e-05	5e+05
21	0.00e+00	3.96e-05	3.78e-09	0.00e+00	9.41e-07	1e+06
22	0.00e+00	7.49e-07	3.57e-11	0.00e+00	8.88e-09	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	3.57e-11	0.00e+00	0.00e+00	1e+00
2	1.23e-17	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.98e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	6.57e-18	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	5.31e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.13e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	1.95e-18	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	2.17e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	6.51e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	3.47e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	0.00e+00	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	1.39e-17	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	0.00e+00	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	1.39e-17	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	1.39e-17	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	0.00e+00	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	7.88e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00

3	5.75e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	1.08e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	2.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	2.49e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	1.08e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	4.55e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	8.67e-19	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	5.20e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	3.47e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	0.00e+00	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	0.00e+00	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	0.00e+00	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	1.39e-17	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	0.00e+00	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	$\rho$
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.05e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.13e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.76e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.45e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	1.08e-18	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.85e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	3.04e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	6.94e-18	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	6.94e-18	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	1.39e-17	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	0.00e+00	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	0.00e+00	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	1.39e-17	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	0.00e+00	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	$\rho$
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03

12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05



21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01

6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03

15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02

9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04

18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00

3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	$\rho$
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	$\rho$
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03

12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05



21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01

6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03

15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02

9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04

18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00

3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03

12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{A}_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{A}_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05



21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01

6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03

15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02

9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04

18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00

3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03

12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_{L_x} $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_{L_x} $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05



21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01

6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	p
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	p
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03

15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02

9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04

18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00

3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03

12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05



21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01

6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03

15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02

9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04

18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00

3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03

12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05



21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01

6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03

15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02

9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04

18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00

3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03

12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05



21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01

6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03

15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02

9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04

18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00

3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03

12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_L x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05



21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01

6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03

15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	p

	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02

9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04

18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00

3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03

12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_{L_x} $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_{L_x} $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05



21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01

6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla A_x $	max(h)	c	compl	p
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03

15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
	9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
	10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
	11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
	12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
	13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
	14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
	15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
	16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
	17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
	18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
	19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
	20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
	21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
	22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter		$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
	1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
	2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
	3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
	4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
	5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
	6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
	7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
	8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02

9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04

18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00

3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$

1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03

12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla \mathcal{L}_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05



21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01

6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03

15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla AL_x $	max(h)	$ c $	compl	$\rho$

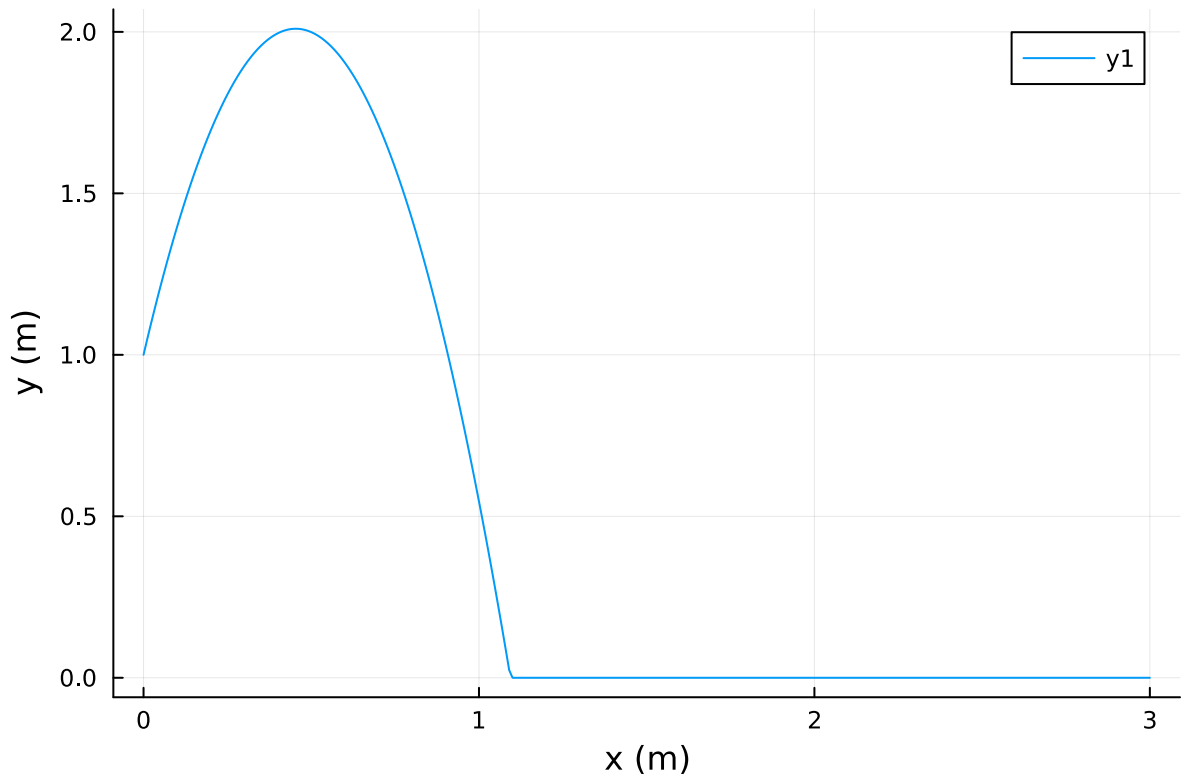
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02

9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04
18	0.00e+00	4.01e-03	3.06e-06	0.00e+00	2.99e-05	1e+05
19	1.39e-17	5.68e-04	2.17e-07	0.00e+00	2.12e-06	3e+05
20	0.00e+00	4.17e-05	7.96e-09	0.00e+00	7.81e-08	5e+05
21	0.00e+00	1.56e-06	1.49e-10	0.00e+00	1.46e-09	1e+06
22	1.39e-17	2.95e-08	1.41e-12	0.00e+00	1.38e-11	2e+06
iter	$ \nabla L_x $	$ \nabla L_x $	max(h)	c	compl	$\rho$
-----						
1	1.00e+00	1.00e+00	1.41e-12	0.00e+00	0.00e+00	1e+00
2	6.31e-18	1.96e-05	9.81e-04	0.00e+00	9.62e-07	2e+00
3	5.06e-18	3.92e-05	9.81e-04	0.00e+00	2.89e-06	4e+00
4	8.40e-19	7.84e-05	9.80e-04	0.00e+00	6.73e-06	8e+00
5	1.71e-18	1.57e-04	9.80e-04	0.00e+00	1.44e-05	2e+01
6	6.51e-18	3.13e-04	9.78e-04	0.00e+00	2.97e-05	3e+01
7	9.76e-19	6.24e-04	9.75e-04	0.00e+00	6.00e-05	6e+01
8	5.42e-18	1.24e-03	9.69e-04	0.00e+00	1.20e-04	1e+02
9	2.60e-18	2.45e-03	9.56e-04	0.00e+00	2.35e-04	3e+02
10	6.94e-18	4.77e-03	9.33e-04	0.00e+00	4.52e-04	5e+02
11	6.94e-18	9.08e-03	8.87e-04	0.00e+00	8.33e-04	1e+03
12	3.47e-18	1.65e-02	8.05e-04	0.00e+00	1.42e-03	2e+03
13	0.00e+00	2.74e-02	6.68e-04	0.00e+00	2.09e-03	4e+03
14	0.00e+00	3.88e-02	4.74e-04	0.00e+00	2.40e-03	8e+03
15	0.00e+00	4.27e-02	2.60e-04	0.00e+00	1.88e-03	2e+04
16	1.39e-17	3.23e-02	9.87e-05	0.00e+00	8.71e-04	3e+04
17	1.39e-17	1.51e-02	2.31e-05	0.00e+00	2.21e-04	7e+04

```

18  0.00e+00  4.01e-03  3.06e-06  0.00e+00  2.99e-05  1e+05
19  1.39e-17  5.68e-04  2.17e-07  0.00e+00  2.12e-06  3e+05
20  0.00e+00  4.17e-05  7.96e-09  0.00e+00  7.81e-08  5e+05
21  0.00e+00  1.56e-06  1.49e-10  0.00e+00  1.46e-09  1e+06
22  1.39e-17  2.95e-08  1.41e-12  0.00e+00  1.38e-11  2e+06
# = /home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1_S24/Q3.ipynb:28 =# @test
(abs(maximum(ys) - 2) < 0.1) = Test Passed
# = /home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1_S24/Q3.ipynb:29 =# @test
(minimum(ys) > -0.01) = Test Passed
# = /home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1_S24/Q3.ipynb:30 =# @test
(abs(xs[end] - 3) < 0.01) = Test Passed

```



```

# = /home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1_S24/Q3.ipynb:33 =# @test
(maximum(xdot) < 1.0001) = Test Passed
# = /home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1_S24/Q3.ipynb:34 =# @test
(minimum(xdot) > 0.9999) = Test Passed
# = /home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1_S24/Q3.ipynb:35 =# @test
(ys[110] > 0.01) = Test Passed
# = /home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1_S24/Q3.ipynb:36 =# @test
(abs(ys[111]) < 0.01) = Test Passed
# = /home/sman/Work/CMU/Courses/OCRL/OCRL2024/HW/HW1_S24/Q3.ipynb:37 =# @test
(abs(ys[112]) < 0.01) = Test Passed

```

```

└ Info: MeshCat server started. You can open the visualizer by visiting the following URL in your browser:
  | http://127.0.0.1:8703
  └ @ MeshCat /root/.julia/packages/MeshCat/vWPbP/src/visualizer.jl:73

```

## Part D (5 pts): Solve a QP

Use your QP solver to solve the following optimization problem:

$$\begin{aligned}
 \min_{y \in \mathbb{R}^2, a \in \mathbb{R}, b \in \mathbb{R}} \quad & \frac{1}{2} y^T \begin{bmatrix} 1 & .3 \\ .3 & 1 \end{bmatrix} y + a^2 + 2b^2 + \begin{bmatrix} -2 & 3.4 \end{bmatrix} y + 2a + 4b \\
 \text{st} \quad & a + b = 1 \\
 & \begin{bmatrix} -1 & 2.3 \end{bmatrix} y + a - 2b = 3 \\
 & -0.5 \leq y \leq 1 \\
 & -1 \leq a \leq 1 \\
 & -1 \leq b \leq 1
 \end{aligned}$$

You should be able to put this into our standard QP form that we used above, and solve.

```

In [7]: function rand_qp()

    qp = (
        Q = [ 1 0.3 0 0;
              0.3 1 0 0;
              0 0 2 0;
              0 0 0 4],
        q = [-2, 3.4, 2, 4],
        A = [ 0 0 1 1;
              -1 2.3 1 -2],
        b = [1, 3],
        G = [ 1 0 0 0;
              0 1 0 0;
              -1 0 0 0;
              0 -1 0 0;
              0 0 1 0;
              0 0 -1 0;
              0 0 0 1;
              0 0 0 -1],
        h = [1, 1, 0.5, 0.5, 1, 1, 1, 1]
    )

    return qp
end

```

rand\_qp (generic function with 1 method)



In [8]: @testset "part D" begin

```
x, λ, μ = solve_qp(rand_qp(); verbose = true, max_iters = 100, tol = 1e-6)
y = x[1:2]
a = x[3]
b = x[4]
```

```
@test norm(y - [-0.080823; 0.834424]) < 1e-3
```

```
@test abs(a - 1) < 1e-3
```

```
@test abs(b) < 1e-3
```

end

iter	$ \nabla L_x $	$ \nabla \lambda_x $	max(h)	$ c $	compl	$\rho$
1	5.96e+00	9.91e+00	-5.00e-01	3.00e+00	0.00e+00	1e+00
2	2.77e-01	9.55e+00	2.77e-01	1.71e+00	7.69e-02	2e+00
3	6.01e-01	2.37e+00	3.01e-01	6.65e-01	1.74e-01	4e+00
4	7.19e-01	4.35e+00	3.12e-01	4.56e-01	5.78e-01	8e+00
5	3.64e-15	2.09e+00	1.94e-01	1.50e-01	6.61e-01	2e+01
6	4.97e-15	1.75e+00	7.82e-02	5.97e-02	3.64e-01	3e+01
7	3.80e-14	8.74e-01	1.96e-02	1.49e-02	1.03e-01	6e+01
8	2.74e-14	2.50e-01	2.80e-03	2.13e-03	1.53e-02	1e+02
9	4.66e-14	3.85e-02	2.15e-04	1.64e-04	1.18e-03	3e+02
10	1.05e-13	3.08e-03	8.62e-06	6.57e-06	4.74e-05	5e+02
11	3.44e-13	1.26e-04	1.76e-07	1.34e-07	9.67e-07	1e+03
12	1.03e-12	2.60e-06	1.82e-09	1.38e-09	9.98e-09	2e+03
13	2.27e-12	2.69e-08	9.42e-12	7.18e-12	5.18e-11	4e+03

```
Test Summary: | Pass Total
part D       |    3      3
```

```
Test.DefaultTestSet("part D", Any[], 3, false, false)
```

## Part E (5 pts): One sentence short answer

1. For our Augmented Lagrangian solver, if our initial guess for  $x$  is feasible (meaning it satisfies the constraints), will it stay feasible through each iteration?

**No, the augmented lagrangian penalizes violation rather than increase cost infinitely near violation**

1. Does the Augmented Lagrangian function for this problem always have continuous first derivatives?

**Yes, the  $\max(0, c(x))^2$  term of the AL has continuous derivative, since the Lagrangian also has a continuous derivative, then AL overall is continuous**

1. Is the QP in part D always convex?

**Yes, the hessian is PD**

```
In [10]: # check if part D QP is always convex:  
         eigvals(rand_qp().Q)
```

```
4-element Vector{Float64}:  
 0.7  
 1.3  
 2.0  
 4.0
```