


```
Float64, Float64, Int64}}, x::Vector{Float64}, fx::Vector{Float64},
integrator::OrdinaryDiffEq.ODEIntegrator{OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}, true,
Vector{Float64}, Nothing, Float64, Tuple{Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Int64}}, Float64, Float64, Float64, Float64, Vector{Vector{Float64}}},
SciMLBase.ODESolution{Float64, 2, Vector{Vector{Float64}}}, Nothing, Nothing,
Vector{Float64}, Vector{Vector{Vector{Float64}}}},
SciMLBase.ODEProblem{Vector{Float64}, Tuple{Float64, Float64}, true, Tuple{Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Int64}}, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, @Kwargs{}},
SciMLBase.StandardODEProblem}, OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing},
OrdinaryDiffEq.InterpolationData{SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Vector{Float64}}},
Vector{Float64}, Vector{Vector{Vector{Float64}}}}, Nothing,
OrdinaryDiffEq.Rosenbrock5Cache{Vector{Float64}, Vector{Float64}, Vector{Float64},
Matrix{Float64}, Matrix{Float64}, OrdinaryDiffEq.Rodas5Tableau{Float64, Float64}},
SciMLBase.TimeGradientWrapper{true, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Float64}, Tuple{Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Int64}}, SciMLBase.UJacobianWrapper{true,
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Float64, Tuple{Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Int64}}, LinearSolve.LinearCache{Matrix{Float64},
Vector{Float64}, Vector{Float64}}, SciMLBase.NullParameters,
LinearSolve.DefaultLinearSolver,
LinearSolve.DefaultLinearSolverInit{LinearAlgebra.LU{Float64, Matrix{Float64}},
Vector{Int64}}, LinearAlgebra.QRCompactWY{Float64, Matrix{Float64}},
```

Matrix{Float64}}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Vector{Int64}},
Nothing, Nothing, Nothing, LinearAlgebra.SVD{Float64, Float64, Matrix{Float64},
Vector{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}},
LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, Tuple{LinearAlgebra.LU{Float64,
Matrix{Float64}, Vector{Int32}}, Base.RefValue{Int32}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Base.RefValue{Int64}}, LinearAlgebra.QRPivoted{Float64, Matrix{Float64},
Vector{Float64}, Vector{Int64}}, Nothing, Nothing},
LinearSolve.InvPreconditioner{LinearAlgebra.Diagonal{Float64, Vector{Float64}}},
LinearAlgebra.Diagonal{Float64, Vector{Float64}}, Float64, Bool,
LinearSolve.LinearSolveAdjoint{Missing}},
SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEq
Base.OrdinaryDiffEqTag, Float64}, Float64, 8}},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}}},
UnitRange{Int64}, Nothing},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 1}}, Float64, OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}},
OrdinaryDiffEq.DifferentialVarsUndefined}, SciMLBase.DEStats, Nothing},
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing},
OrdinaryDiffEq.Rosenbrock5Cache{Vector{Float64}, Vector{Float64}, Vector{Float64},
Matrix{Float64}, Matrix{Float64}, OrdinaryDiffEq.Rodas5Tableau{Float64, Float64},
SciMLBase.TimeGradientWrapper{true, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Float64}, Tuple{Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Int64}}, SciMLBase.UJacobianWrapper{true,
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Float64, Tuple{Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Int64}}, LinearSolve.LinearCache{Matrix{Float64},
Vector{Float64}, Vector{Float64}, SciMLBase.NullParameters,
LinearSolve.DefaultLinearSolver,
LinearSolve.DefaultLinearSolverInit{LinearAlgebra.LU{Float64, Matrix{Float64},

```

Vector{Int64}}, LinearAlgebra.QRCompactWY{Float64, Matrix{Float64},
Matrix{Float64}}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Vector{Int64}},
Nothing, Nothing, Nothing, LinearAlgebra.SVD{Float64, Float64, Matrix{Float64},
Vector{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}},
LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, Tuple{LinearAlgebra.LU{Float64,
Matrix{Float64}, Vector{Int32}}, Base.RefValue{Int32}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Base.RefValue{Int64}}, LinearAlgebra.QRPivoted{Float64, Matrix{Float64},
Vector{Float64}, Vector{Int64}}, Nothing, Nothing},
LinearSolve.InvPreconditioner{LinearAlgebra.Diagonal{Float64, Vector{Float64}}},
LinearAlgebra.Diagonal{Float64, Vector{Float64}}, Float64, Bool,
LinearSolve.LinearSolveAdjoint{Missing}},
SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEq
Base.OrdinaryDiffEqTag, Float64}}, Float64, 8}},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}}},
UnitRange{Int64}, Nothing},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 1}}, Float64, OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}},
OrdinaryDiffEq.DEOptions{Float64, Float64, Float64, Float64,
OrdinaryDiffEq.PIController{Rational{Int64}}, typeof(DiffEqBase.ODE_DEFAULT_NORM),
typeof(LinearAlgebra.opnorm), Nothing, SciMLBase.CallbackSet{Tuple{}, Tuple{}},
typeof(DiffEqBase.ODE_DEFAULT_ISOUTOFDOMAIN),
typeof(DiffEqBase.ODE_DEFAULT_PROG_MESSAGE),
typeof(DiffEqBase.ODE_DEFAULT_UNSTABLE_CHECK)}, DataStructures.BinaryHeap{Float64,
DataStructures.FasterForward}, DataStructures.BinaryHeap{Float64,
DataStructures.FasterForward}, Nothing, Nothing, Int64, Tuple{}, Tuple{}, Tuple{}},
Vector{Float64}, Float64, Nothing, OrdinaryDiffEq.DefaultInit,
OrdinaryDiffEq.DifferentialVarsUndefined},
jac_config::SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff
Tag{DiffEqBase.OrdinaryDiffEqTag, Float64}}, Float64, 8}},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}}},
UnitRange{Int64}, Nothing)

```

```

@ OrdinaryDiffEq
C:\Users\Vickram\.julia\packages\OrdinaryDiffEq\DmspS\src\derivative_wrappers.jl:23
7

```

```
[2] calc_J!
```

```
@
```

```
C:\Users\Vickram\.julia\packages\OrdinaryDiffEq\DmspS\src\derivative_utils.jl:144
[inlined]
```

```
[3] calc_W!
```

```
@
```

```
C:\Users\Vickram\.julia\packages\OrdinaryDiffEq\DmspS\src\derivative_utils.jl:704
[inlined]
```

```
[4] calc_W!
```

```
@
```

C:\Users\Vickram\.julia\packages\OrdinaryDiffEq\DmspS\src\derivative_utils.jl:634
[inlined]

[5]

```
calc_rosenbrock_differentiation!(integrator::OrdinaryDiffEq.ODEIntegrator{OrdinaryD  
iffEq.Rodas5P{8, true, Nothing, typeof(OrdinaryDiffEq.DEFAULT_PRECS)},  
Val{:forward}, true, nothing}, true, Vector{Float64}, Nothing, Float64,  
Tuple{Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,  
Float64, Float64, Float64, Float64, Float64, Int64}, Float64, Float64, Float64,  
Float64, Vector{Vector{Float64}}, SciMLBase.ODESolution{Float64, 2,  
Vector{Vector{Float64}}, Nothing, Nothing, Vector{Float64},  
Vector{Vector{Vector{Float64}}}, SciMLBase.ODEProblem{Vector{Float64},  
Tuple{Float64, Float64}, true, Tuple{Float64, Float64, Float64, Float64, Float64,  
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Int64},  
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,  
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},  
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,  
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,  
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,  
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, @Kwargs{  
SciMLBase.StandardODEProblem}, OrdinaryDiffEq.Rodas5P{8, true, Nothing,  
typeof(OrdinaryDiffEq.DEFAULT_PRECS)}, Val{:forward}, true, nothing},  
OrdinaryDiffEq.InterpolationData{SciMLBase.ODEFunction{true,  
SciMLBase.FullSpecialize,  
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},  
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,  
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,  
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,  
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Vector{Float64}},  
Vector{Float64}, Vector{Vector{Vector{Float64}}}, Nothing,  
OrdinaryDiffEq.Rosenbrock5Cache{Vector{Float64}, Vector{Float64}, Vector{Float64},  
Matrix{Float64}, Matrix{Float64}, OrdinaryDiffEq.Rodas5Tableau{Float64, Float64},  
SciMLBase.TimeGradientWrapper{true, SciMLBase.ODEFunction{true,  
SciMLBase.FullSpecialize,  
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},  
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,  
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,  
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,  
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Float64}, Tuple{Float64,  
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,  
Float64, Float64, Float64, Int64}}, SciMLBase.UJacobianWrapper{true,  
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,  
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},  
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,  
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,  
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,  
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Float64, Tuple{Float64, Float64,  
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,  
Float64, Float64, Int64}}, LinearSolve.LinearCache{Matrix{Float64},  
Vector{Float64}, Vector{Float64}}, SciMLBase.NullParameters,  
LinearSolve.DefaultLinearSolver,
```

```
LinearSolve.DefaultLinearSolverInit{LinearAlgebra.LU{Float64, Matrix{Float64},
Vector{Int64}}, LinearAlgebra.QRCompactWY{Float64, Matrix{Float64},
Matrix{Float64}}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Vector{Int64}},
Nothing, Nothing, Nothing, LinearAlgebra.SVD{Float64, Float64, Matrix{Float64},
Vector{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}},
LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, Tuple{LinearAlgebra.LU{Float64,
Matrix{Float64}, Vector{Int32}}, Base.RefValue{Int32}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Base.RefValue{Int64}}, LinearAlgebra.QRPivoted{Float64, Matrix{Float64},
Vector{Float64}, Vector{Int64}}, Nothing, Nothing},
LinearSolve.InvPreconditioner{LinearAlgebra.Diagonal{Float64, Vector{Float64}}},
LinearAlgebra.Diagonal{Float64, Vector{Float64}}, Float64, Bool,
LinearSolve.LinearSolveAdjoint{Missing}},
SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEq
Base.OrdinaryDiffEqTag, Float64}}, Float64, 8}},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}}},
UnitRange{Int64}, Nothing},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 1}}, Float64, OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}},
OrdinaryDiffEq.DifferentialVarsUndefined}, SciMLBase.DEStats, Nothing},
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing},
OrdinaryDiffEq.Rosenbrock5Cache{Vector{Float64}, Vector{Float64}, Vector{Float64},
Matrix{Float64}, Matrix{Float64}, OrdinaryDiffEq.Rodas5Tableau{Float64, Float64},
SciMLBase.TimeGradientWrapper{true, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Float64}, Tuple{Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Int64}}, SciMLBase.UJacobianWrapper{true,
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Float64, Tuple{Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Int64}}, LinearSolve.LinearCache{Matrix{Float64},
Vector{Float64}, Vector{Float64}}, SciMLBase.NullParameters,
```

```
LinearSolve.DefaultLinearSolver,  
LinearSolve.DefaultLinearSolverInit{LinearAlgebra.LU{Float64, Matrix{Float64},  
Vector{Int64}}, LinearAlgebra.QRCompactWY{Float64, Matrix{Float64},  
Matrix{Float64}}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,  
LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},  
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Vector{Int64}},  
Nothing, Nothing, Nothing, LinearAlgebra.SVD{Float64, Float64, Matrix{Float64},  
Vector{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}},  
LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, Tuple{LinearAlgebra.LU{Float64,  
Matrix{Float64}, Vector{Int32}}, Base.RefValue{Int32}},  
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},  
Base.RefValue{Int64}}, LinearAlgebra.QRPivoted{Float64, Matrix{Float64},  
Vector{Float64}, Vector{Int64}}, Nothing, Nothing},  
LinearSolve.InvPreconditioner{LinearAlgebra.Diagonal{Float64, Vector{Float64}}},  
LinearAlgebra.Diagonal{Float64, Vector{Float64}}, Float64, Bool,  
LinearSolve.LinearSolveAdjoint{Missing}},  
SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEq  
Base.OrdinaryDiffEqTag, Float64}}, Float64, 8}},  
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},  
Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}}},  
UnitRange{Int64}, Nothing},  
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},  
Float64, 1}}, Float64, OrdinaryDiffEq.Rodas5P{8, true, Nothing,  
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}},  
OrdinaryDiffEq.DEOptions{Float64, Float64, Float64, Float64,  
OrdinaryDiffEq.PIController{Rational{Int64}}, typeof(DiffEqBase.ODE_DEFAULT_NORM),  
typeof(LinearAlgebra.opnorm), Nothing, SciMLBase.CallbackSet{Tuple{}, Tuple{}},  
typeof(DiffEqBase.ODE_DEFAULT_ISOUTOFDOMAIN),  
typeof(DiffEqBase.ODE_DEFAULT_PROG_MESSAGE),  
typeof(DiffEqBase.ODE_DEFAULT_UNSTABLE_CHECK), DataStructures.BinaryHeap{Float64,  
DataStructures.FasterForward}, DataStructures.BinaryHeap{Float64,  
DataStructures.FasterForward}, Nothing, Nothing, Int64, Tuple{}, Tuple{}, Tuple{}},  
Vector{Float64}, Float64, Nothing, OrdinaryDiffEq.DefaultInit,  
OrdinaryDiffEq.DifferentialVarsUndefined},  
cache::OrdinaryDiffEq.Rosenbrock5Cache{Vector{Float64}, Vector{Float64},  
Vector{Float64}, Matrix{Float64}, Matrix{Float64}},  
OrdinaryDiffEq.Rodas5Tableau{Float64, Float64}, SciMLBase.TimeGradientWrapper{true,  
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,  
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},  
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,  
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing},  
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,  
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Float64}, Tuple{Float64,  
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,  
Float64, Float64, Float64, Int64}}, SciMLBase.UJacobianWrapper{true,  
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,  
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},  
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,  
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing},  
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
```

```
Union{Expr, Number, Symbol}}}, Nothing, Nothing}, Float64, Tuple{Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Int64}}, LinearSolve.LinearCache{Matrix{Float64},
Vector{Float64}, Vector{Float64}, SciMLBase.NullParameters,
LinearSolve.DefaultLinearSolver,
LinearSolve.DefaultLinearSolverInit{LinearAlgebra.LU{Float64, Matrix{Float64},
Vector{Int64}}, LinearAlgebra.QRCompactWY{Float64, Matrix{Float64},
Matrix{Float64}}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Vector{Int64}},
Nothing, Nothing, Nothing, LinearAlgebra.SVD{Float64, Float64, Matrix{Float64},
Vector{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}},
LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, Tuple{LinearAlgebra.LU{Float64,
Matrix{Float64}, Vector{Int32}}, Base.RefValue{Int32}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Base.RefValue{Int64}}, LinearAlgebra.QRPivoted{Float64, Matrix{Float64},
Vector{Float64}, Vector{Int64}}, Nothing, Nothing},
LinearSolve.InvPreconditioner{LinearAlgebra.Diagonal{Float64, Vector{Float64}}},
LinearAlgebra.Diagonal{Float64, Vector{Float64}}, Float64, Bool,
LinearSolve.LinearSolveAdjoint{Missing}},
SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEq
Base.OrdinaryDiffEqTag, Float64}}, Float64, 8}},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}}},
UnitRange{Int64}, Nothing},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 1}}, Float64, OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}},
dtd1::Float64, dtgamma::Float64, repeat_step::Bool, W_transform::Bool)
```

```
@ OrdinaryDiffEq
```

```
C:\Users\Vickram\.julia\packages\OrdinaryDiffEq\Dmsps\src\derivative_utils.jl:798
```

```
[6]
```

```
perform_step!(integrator::OrdinaryDiffEq.ODEIntegrator{OrdinaryDiffEq.Rodas5P{8,
true, Nothing, typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing},
true, Vector{Float64}, Nothing, Float64, Tuple{Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Int64}}, Float64, Float64, Float64, Float64, Vector{Vector{Float64}}},
SciMLBase.ODESolution{Float64, 2, Vector{Vector{Float64}}, Nothing, Nothing,
Vector{Float64}, Vector{Vector{Vector{Float64}}}},
SciMLBase.ODEProblem{Vector{Float64}, Tuple{Float64, Float64}, true, Tuple{Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Int64}}, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}, Nothing, Nothing}, @Kwargs{},
SciMLBase.StandardODEProblem}, OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing},
```



```
OrdinaryDiffEq.InterpolationData{SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}, Nothing, Nothing}, Vector{Vector{Float64}},
Vector{Float64}, Vector{Vector{Vector{Float64}}}, Nothing,
OrdinaryDiffEq.Rosenbrock5Cache{Vector{Float64}, Vector{Float64}, Vector{Float64},
Matrix{Float64}, Matrix{Float64}, OrdinaryDiffEq.Rodas5Tableau{Float64, Float64},
SciMLBase.TimeGradientWrapper{true, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}, Nothing, Nothing}, Vector{Float64}, Tuple{Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Int64}}, SciMLBase.UJacobianWrapper{true,
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}, Nothing, Nothing}, Float64, Tuple{Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Int64}}, LinearSolve.LinearCache{Matrix{Float64},
Vector{Float64}, Vector{Float64}, SciMLBase.NullParameters,
LinearSolve.DefaultLinearSolver,
LinearSolve.DefaultLinearSolverInit{LinearAlgebra.LU{Float64, Matrix{Float64},
Vector{Int64}}, LinearAlgebra.QRCompactWY{Float64, Matrix{Float64},
Matrix{Float64}}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Vector{Int64}},
Nothing, Nothing, Nothing, LinearAlgebra.SVD{Float64, Float64, Matrix{Float64},
Vector{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}},
LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, Tuple{LinearAlgebra.LU{Float64,
Matrix{Float64}, Vector{Int32}}, Base.RefValue{Int32}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Base.RefValue{Int64}}, LinearAlgebra.QRPivoted{Float64, Matrix{Float64},
Vector{Float64}, Vector{Int64}}, Nothing, Nothing},
LinearSolve.InvPreconditioner{LinearAlgebra.Diagonal{Float64, Vector{Float64}}},
LinearAlgebra.Diagonal{Float64, Vector{Float64}}, Float64, Bool,
LinearSolve.LinearSolveAdjoint{Missing}},
SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEq
Base.OrdinaryDiffEqTag, Float64}, Float64, 8}},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}},
UnitRange{Int64}, Nothing},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
```

Float64, 1}}, Float64, OrdinaryDiffEq.Rodas5P{8, true, Nothing, typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}}, OrdinaryDiffEq.DifferentialVarsUndefined}, SciMLBase.DEStats, Nothing}, SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize, ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing, SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol, Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, OrdinaryDiffEq.Rosenbrock5Cache{Vector{Float64}, Vector{Float64}, Vector{Float64}, Matrix{Float64}, Matrix{Float64}, OrdinaryDiffEq.Rodas5Tableau{Float64, Float64}, SciMLBase.TimeGradientWrapper{true, SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize, ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing, SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol, Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Float64}, Tuple{Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Int64}}, SciMLBase.UJacobianWrapper{true, SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize, ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing, SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol, Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Float64, Tuple{Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Int64}}, LinearSolve.LinearCache{Matrix{Float64}, Vector{Float64}, Vector{Float64}, SciMLBase.NullParameters, LinearSolve.DefaultLinearSolver, LinearSolve.DefaultLinearSolverInit{LinearAlgebra.LU{Float64, Matrix{Float64}}, Vector{Int64}}, LinearAlgebra.QRCompactWY{Float64, Matrix{Float64}, Matrix{Float64}}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}}, Vector{Int64}}, Vector{Int64}}, Nothing, Nothing, Nothing, LinearAlgebra.SVD{Float64, Float64, Matrix{Float64}}, Vector{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int32}}, Base.RefValue{Int32}}, Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Base.RefValue{Int64}}, LinearAlgebra.QRPivoted{Float64, Matrix{Float64}, Vector{Float64}, Vector{Int64}}, Nothing, Nothing}, LinearSolve.InvPreconditioner{LinearAlgebra.Diagonal{Float64, Vector{Float64}}}, LinearAlgebra.Diagonal{Float64, Vector{Float64}}, Float64, Bool, LinearSolve.LinearSolveAdjoint{Missing}}, SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64}}, Float64, 8}}, Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64}}, Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}}}, UnitRange{Int64}, Nothing},

```
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 1}}, Float64, OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}},
OrdinaryDiffEq.DEOptions{Float64, Float64, Float64, Float64,
OrdinaryDiffEq.PIController{Rational{Int64}}, typeof(DiffEqBase.ODE_DEFAULT_NORM),
typeof(LinearAlgebra.opnorm), Nothing, SciMLBase.CallbackSet{Tuple{}, Tuple{}},
typeof(DiffEqBase.ODE_DEFAULT_ISOUTOFDOMAIN),
typeof(DiffEqBase.ODE_DEFAULT_PROG_MESSAGE),
typeof(DiffEqBase.ODE_DEFAULT_UNSTABLE_CHECK), DataStructures.BinaryHeap{Float64,
DataStructures.FasterForward}, DataStructures.BinaryHeap{Float64,
DataStructures.FasterForward}, Nothing, Nothing, Int64, Tuple{}, Tuple{}, Tuple{}},
Vector{Float64}, Float64, Nothing, OrdinaryDiffEq.DefaultInit,
OrdinaryDiffEq.DifferentialVarsUndefined},
cache::OrdinaryDiffEq.Rosenbrock5Cache{Vector{Float64}, Vector{Float64},
Vector{Float64}, Matrix{Float64}, Matrix{Float64},
OrdinaryDiffEq.Rodas5Tableau{Float64, Float64}, SciMLBase.TimeGradientWrapper{true,
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Float64}, Tuple{Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Int64}}, SciMLBase.UJacobianWrapper{true,
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Float64, Tuple{Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Int64}}, LinearSolve.LinearCache{Matrix{Float64},
Vector{Float64}, Vector{Float64}, SciMLBase.NullParameters,
LinearSolve.DefaultLinearSolver,
LinearSolve.DefaultLinearSolverInit{LinearAlgebra.LU{Float64, Matrix{Float64},
Vector{Int64}}, LinearAlgebra.QRCompactWY{Float64, Matrix{Float64},
Matrix{Float64}}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Vector{Int64}},
Nothing, Nothing, Nothing, LinearAlgebra.SVD{Float64, Float64, Matrix{Float64},
Vector{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}},
LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, Tuple{LinearAlgebra.LU{Float64,
Matrix{Float64}, Vector{Int32}}, Base.RefValue{Int32}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Base.RefValue{Int64}}, LinearAlgebra.QRPivoted{Float64, Matrix{Float64},
Vector{Float64}, Vector{Int64}}, Nothing, Nothing},
LinearSolve.InvPreconditioner{LinearAlgebra.Diagonal{Float64, Vector{Float64}}},
LinearAlgebra.Diagonal{Float64, Vector{Float64}}, Float64, Bool,
LinearSolve.LinearSolveAdjoint{Missing}},
SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEq
```

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Base.OrdinaryDiffEqTag, Float64}, Float64, 8}},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}}},
UnitRange{Int64}, Nothing},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 1}}, Float64, OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}},
repeat_step::Bool)
  @ OrdinaryDiffEq
C:\Users\Vickram\.julia\packages\OrdinaryDiffEq\DmspS\src\perform_step\rosenbrock_p
erform_step.jl:2476
 [7] perform_step!
  @
C:\Users\Vickram\.julia\packages\OrdinaryDiffEq\DmspS\src\perform_step\rosenbrock_p
erform_step.jl:2427 [inlined]
 [8] solve!(integrator::OrdinaryDiffEq.ODEIntegrator{OrdinaryDiffEq.Rodas5P{8,
true, Nothing, typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing},
true, Vector{Float64}, Nothing, Float64, Tuple{Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Int64}, Float64, Float64, Float64, Float64, Vector{Vector{Float64}}},
SciMLBase.ODESolution{Float64, 2, Vector{Vector{Float64}}}, Nothing, Nothing,
Vector{Float64}, Vector{Vector{Vector{Float64}}}},
SciMLBase.ODEProblem{Vector{Float64}, Tuple{Float64, Float64}, true, Tuple{Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Int64}, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, @Kwargs{},
SciMLBase.StandardODEProblem}, OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing},
OrdinaryDiffEq.InterpolationData{SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Vector{Float64}}},
Vector{Float64}, Vector{Vector{Vector{Float64}}}}, Nothing,
OrdinaryDiffEq.Rosenbrock5Cache{Vector{Float64}, Vector{Float64}, Vector{Float64},
Matrix{Float64}, Matrix{Float64}, OrdinaryDiffEq.Rodas5Tableau{Float64, Float64},
SciMLBase.TimeGradientWrapper{true, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Vector{Float64}, Tuple{Float64,

```

Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Int64}}, SciMLBase.UJacobianWrapper{true, SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize, ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing, SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol, Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Float64, Tuple{Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Int64}}, LinearSolve.LinearCache{Matrix{Float64}, Vector{Float64}, Vector{Float64}, SciMLBase.NullParameters, LinearSolve.DefaultLinearSolver, LinearSolve.DefaultLinearSolverInit{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, LinearAlgebra.QRCompactWY{Float64, Matrix{Float64}, Matrix{Float64}}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Vector{Int64}}, Nothing, Nothing, Nothing, LinearAlgebra.SVD{Float64, Float64, Matrix{Float64}, Vector{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int32}}, Base.RefValue{Int32}}, Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Base.RefValue{Int64}}, LinearAlgebra.QRPivoted{Float64, Matrix{Float64}, Vector{Float64}, Vector{Int64}}, Nothing, Nothing}, LinearSolve.InvPreconditioner{LinearAlgebra.Diagonal{Float64, Vector{Float64}}}, LinearAlgebra.Diagonal{Float64, Vector{Float64}}, Float64, Bool, LinearSolve.LinearSolveAdjoint{Missing}}, SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64}, Float64, 8}}, Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64}, Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}}}, UnitRange{Int64}, Nothing}, Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64}, Float64, 1}}, Float64, OrdinaryDiffEq.Rodas5P{8, true, Nothing, typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}}, OrdinaryDiffEq.DifferentialVarsUndefined}, SciMLBase.DEStats, Nothing}, SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize, ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing, SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol, Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, OrdinaryDiffEq.Rosenbrock5Cache{Vector{Float64}, Vector{Float64}, Vector{Float64}, Matrix{Float64}, Matrix{Float64}, OrdinaryDiffEq.Rodas5Tableau{Float64, Float64}}, SciMLBase.TimeGradientWrapper{true, SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize, ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing, SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,

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Union{Expr, Number, Symbol}}}, Nothing, Nothing}, Vector{Float64}, Tuple{Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Int64}}, SciMLBase.UJacobianWrapper{true,
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, Float64, Tuple{Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Int64}}, LinearSolve.LinearCache{Matrix{Float64},
Vector{Float64}, Vector{Float64}, SciMLBase.NullParameters,
LinearSolve.DefaultLinearSolver,
LinearSolve.DefaultLinearSolverInit{LinearAlgebra.LU{Float64, Matrix{Float64},
Vector{Int64}}, LinearAlgebra.QRCompactWY{Float64, Matrix{Float64},
Matrix{Float64}}, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}}, Vector{Int64}},
Nothing, Nothing, Nothing, LinearAlgebra.SVD{Float64, Float64, Matrix{Float64},
Vector{Float64}}, LinearAlgebra.Cholesky{Float64, Matrix{Float64}},
LinearAlgebra.Cholesky{Float64, Matrix{Float64}}, Tuple{LinearAlgebra.LU{Float64,
Matrix{Float64}, Vector{Int32}}, Base.RefValue{Int32}},
Tuple{LinearAlgebra.LU{Float64, Matrix{Float64}, Vector{Int64}},
Base.RefValue{Int64}}, LinearAlgebra.QRPivoted{Float64, Matrix{Float64},
Vector{Float64}, Vector{Int64}}, Nothing, Nothing},
LinearSolve.InvPreconditioner{LinearAlgebra.Diagonal{Float64, Vector{Float64}}},
LinearAlgebra.Diagonal{Float64, Vector{Float64}}, Float64, Bool,
LinearSolve.LinearSolveAdjoint{Missing}},
SparseDiffTools.ForwardColorJacCache{Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEq
Base.OrdinaryDiffEqTag, Float64}}, Float64, 8}},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64}},
Float64, 8}}, Vector{Float64}, Vector{Vector{NTuple{8, Float64}}}},
UnitRange{Int64}, Nothing},
Vector{ForwardDiff.Dual{ForwardDiff.Tag{DiffEqBase.OrdinaryDiffEqTag, Float64},
Float64, 1}}, Float64, OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing}},
OrdinaryDiffEq.DEOptions{Float64, Float64, Float64, Float64,
OrdinaryDiffEq.PIController{Rational{Int64}}, typeof(DiffEqBase.ODE_DEFAULT_NORM),
typeof(LinearAlgebra.opnorm), Nothing, SciMLBase.CallbackSet{Tuple{}, Tuple{}},
typeof(DiffEqBase.ODE_DEFAULT_ISOUTOFDOMAIN),
typeof(DiffEqBase.ODE_DEFAULT_PROG_MESSAGE),
typeof(DiffEqBase.ODE_DEFAULT_UNSTABLE_CHECK)}, DataStructures.BinaryHeap{Float64,
DataStructures.FasterForward}, DataStructures.BinaryHeap{Float64,
DataStructures.FasterForward}, Nothing, Nothing, Int64, Tuple{}, Tuple{}, Tuple{}},
Vector{Float64}, Float64, Nothing, OrdinaryDiffEq.DefaultInit,
OrdinaryDiffEq.DifferentialVarsUndefined})

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```
@ OrdinaryDiffEq
```

```
C:\Users\Vickram\.julia\packages\OrdinaryDiffEq\DmspS\src\solve.jl:544
```

```
[9] __solve(::SciMLBase.ODEProblem{Vector{Float64}, Tuple{Float64, Float64},
true, Tuple{Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
```

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Float64, Float64, Float64, Float64, Float64, Int64}, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, @Kwargs{},
SciMLBase.StandardODEProblem}, ::OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing};
kwargs::@Kwargs{reltol::Float64, abstol::Float64})
  @ OrdinaryDiffEq
C:\Users\Vickram\.julia\packages\OrdinaryDiffEq\DmspS\src\solve.jl:7
 [10] __solve
  @ C:\Users\Vickram\.julia\packages\OrdinaryDiffEq\DmspS\src\solve.jl:1
[inlined]
 [11] solve_call(_prob::SciMLBase.ODEProblem{Vector{Float64}, Tuple{Float64,
Float64}}, true, Tuple{Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Float64, Float64, Float64, Int64},
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, @Kwargs{},
SciMLBase.StandardODEProblem}, args::OrdinaryDiffEq.Rodas5P{8, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing};
merge_callbacks::Bool, kwargshandle::Nothing, kwargs::@Kwargs{reltol::Float64,
abstol::Float64})
  @ DiffEqBase C:\Users\Vickram\.julia\packages\DiffEqBase\8vI1R\src\solve.jl:612
 [12] solve_up(prob::SciMLBase.ODEProblem{Vector{Float64}, Tuple{Float64, Float64}},
true, Tuple{Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Float64, Int64}, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, @Kwargs{},
SciMLBase.StandardODEProblem}, sensealg::Nothing, u0::Vector{Float64},
p::Tuple{Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Float64, Int64},
args::OrdinaryDiffEq.Rodas5P{0, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing};
kwargs::@Kwargs{reltol::Float64, abstol::Float64})
  @ DiffEqBase
C:\Users\Vickram\.julia\packages\DiffEqBase\8vI1R\src\solve.jl:1080
 [13] solve_up
  @ C:\Users\Vickram\.julia\packages\DiffEqBase\8vI1R\src\solve.jl:1066 [inlined]
 [14] solve(prob::SciMLBase.ODEProblem{Vector{Float64}, Tuple{Float64, Float64}},
true, Tuple{Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Float64, Int64},
SciMLBase.ODEFunction{true, SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}}, Nothing, Nothing}, @Kwargs{},
SciMLBase.StandardODEProblem}, sensealg::Nothing, u0::Vector{Float64},
p::Tuple{Float64, Float64, Float64, Float64, Float64, Float64, Float64, Float64,
Float64, Float64, Float64, Float64, Int64},
args::OrdinaryDiffEq.Rodas5P{0, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing};
kwargs::@Kwargs{reltol::Float64, abstol::Float64})
  @ DiffEqBase

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Float64, Float64, Float64, Float64, Float64, Int64}, SciMLBase.ODEFunction{true,
SciMLBase.FullSpecialize,
ComposedFunction{typeof(SciMLBasePythonCallExt._pyconvert), Py}, Matrix{Float64},
Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing, Nothing,
Nothing, Nothing, typeof(SciMLBase.DEFAULT_OBSERVED), Nothing,
SymbolicIndexingInterface.SymbolCache{Nothing, Nothing, Nothing, Dict{Symbol,
Union{Expr, Number, Symbol}}}, Nothing, Nothing}, @Kwargs{},
SciMLBase.StandardODEProblem}, args::OrdinaryDiffEq.Rodas5P{0, true, Nothing,
typeof(OrdinaryDiffEq.DEFAULT_PRECS), Val{:forward}, true, nothing};
sensealg::Nothing, u0::Nothing, p::Nothing, wrap::Val{true},
kwargs::@Kwargs{reltol::Float64, abstol::Float64})
  @ DiffEqBase
C:\Users\Vickram\.julia\packages\DiffEqBase\8vI1R\src\solve.jl:1003
 [15] pyjlany_call(self::typeof(CommonSolve.solve), args_::Py, kwargs_::Py)
  @ PythonCall
C:\Users\Vickram\.julia\packages\PythonCall\wXfah\src\jlwrap\any.jl:34
 [16] _pyjl_callmethod(f::Any, self_::Ptr{PythonCall.C.PyObject},
args_::Ptr{PythonCall.C.PyObject}, nargs::Int64)
  @ PythonCall
C:\Users\Vickram\.julia\packages\PythonCall\wXfah\src\jlwrap\base.jl:69
 [17] _pyjl_callmethod(o::Ptr{PythonCall.C.PyObject},
args_::Ptr{PythonCall.C.PyObject})
  @ PythonCall.C
C:\Users\Vickram\.julia\packages\PythonCall\wXfah\src\cpython\jlwrap.jl:47
```