[](https://www.comsol.com/)

ES607-Project III GP-II COMSOL CD vs Re 0.1-100

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| --- | --- |
| Report date | Nov 24, 2024 6:27:24 AM |

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1. Global Definitions

|  |  |
| --- | --- |
| Date | Nov 21, 2024 3:55:18 PM |

Global settings

|  |  |
| --- | --- |
| Name | ES607-Project III GP-II COMSOL CD vs Re 0.1-100.mph |
| Path | C:\Users\mayan\Desktop\ASM Sir HW Notes\ES607-Project III GP-II COMSOL CD vs Re 0.1-100.mph |
| Version | COMSOL Multiphysics 5.6 (Build: 401) |
| Unit system | None |

Used products

|  |
| --- |
| COMSOL Multiphysics |

Computer information

|  |  |
| --- | --- |
| CPU | AMD64 Family 23 Model 104 Stepping 1, 6 cores |
| Operating system | Windows 10 |

* 1. Parameters

Parameters 1

| **Name** | **Expression** | **Value** | **Description** |
| --- | --- | --- | --- |
| H | 50 | 50 |  |
| W | 70 | 70 |  |
| Re | 0.01 | 0.01 |  |

1. Component 1

|  |  |
| --- | --- |
| Date | Nov 21, 2024 2:11:52 PM |

Settings

| **Description** | **Value** |
| --- | --- |
| Unit system | Same as global system (None) |
| Geometry shape function | Automatic |

Spatial frame coordinates

| **First** | **Second** | **Third** |
| --- | --- | --- |
| r | phi | z |

Material frame coordinates

| **First** | **Second** | **Third** |
| --- | --- | --- |
| R | PHI | Z |

Geometry frame coordinates

| **First** | **Second** | **Third** |
| --- | --- | --- |
| Rg | PHIg | Zg |

Mesh frame coordinates

| **First** | **Second** | **Third** |
| --- | --- | --- |
| Rm | PHIm | Zm |

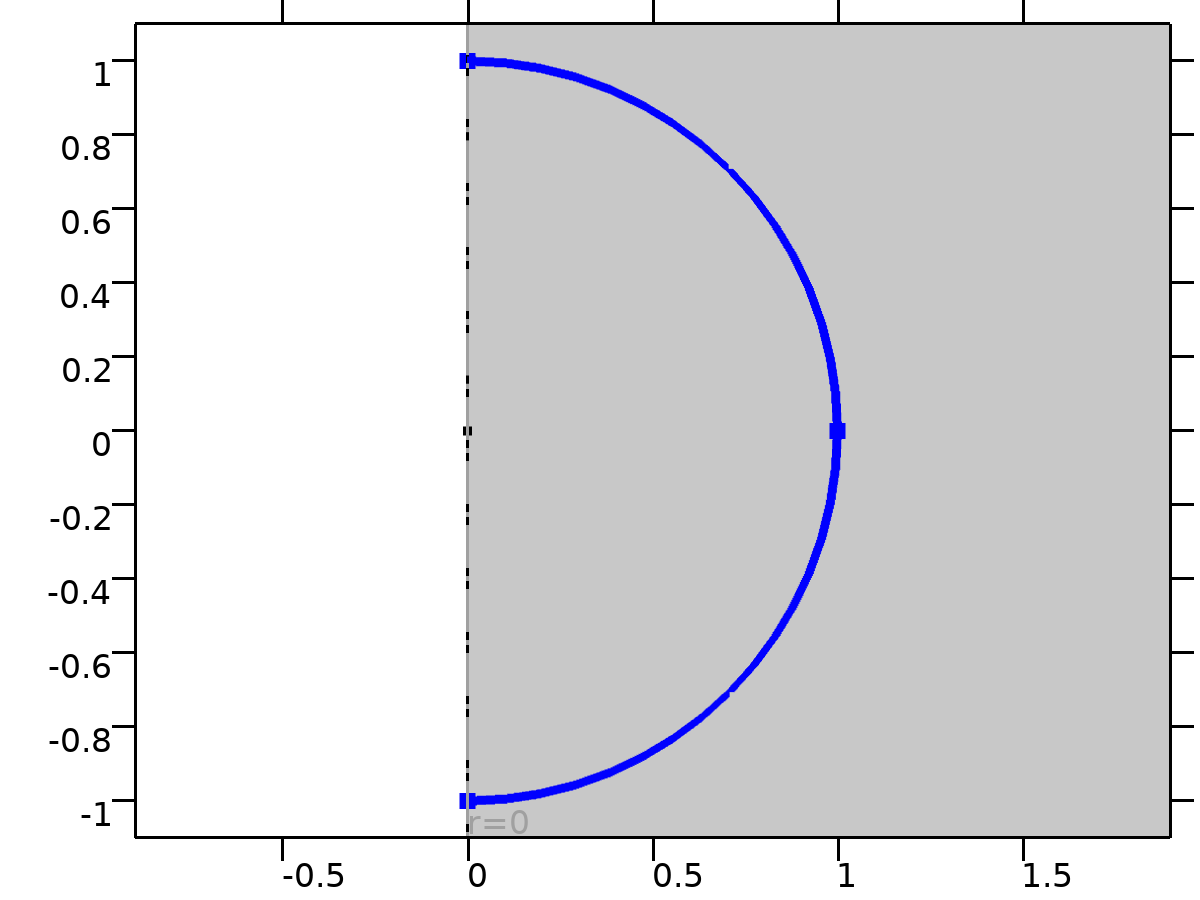
* 1. Definitions
     1. Nonlocal Couplings

#### Integration 1

|  |  |
| --- | --- |
| Coupling type | Integration |
| Operator name | intop1 |

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Geometry geom1: Dimension 1: Boundaries 8–9 |



Selection

Advanced

| **Description** | **Value** |
| --- | --- |
| Compute integral in revolved geometry | On |

* + 1. Coordinate Systems

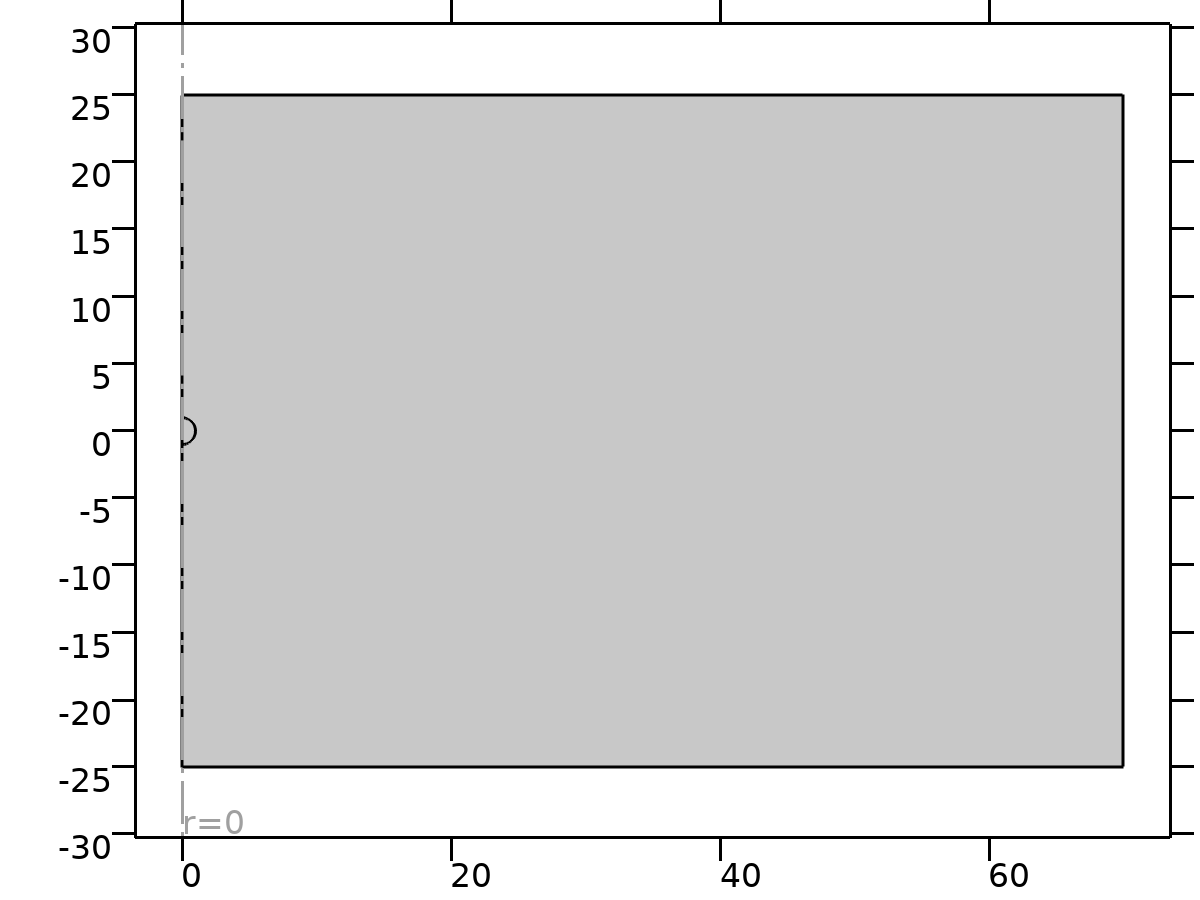
#### Boundary System 1

|  |  |
| --- | --- |
| Coordinate system type | Boundary system |
| Tag | sys1 |

Coordinate names

| **First** | **Second** | **Third** |
| --- | --- | --- |
| t1 | to | n |

* 1. Geometry 1



Geometry 1

Geometry statistics

| **Description** | **Value** |
| --- | --- |
| Space dimension | 2 |
| Number of domains | 2 |
| Number of boundaries | 9 |
| Number of vertices | 8 |

* + 1. Circle 1 (c1)

Position

| **Description** | **Value** |
| --- | --- |
| Position | {0, 0} |

Rotation angle

| **Description** | **Value** |
| --- | --- |
| Rotation | -90 |

Size and shape

| **Description** | **Value** |
| --- | --- |
| Radius | 1 |
| Sector angle | 180 |

* + 1. Rectangle 1 (r1)

Position

| **Description** | **Value** |
| --- | --- |
| Position | {0, -H/2} |

Size

| **Description** | **Value** |
| --- | --- |
| Width | W |
| Height | H |

* + 1. Rectangle 2 (r2)

Position

| **Description** | **Value** |
| --- | --- |
| Position | {0, -H/2} |

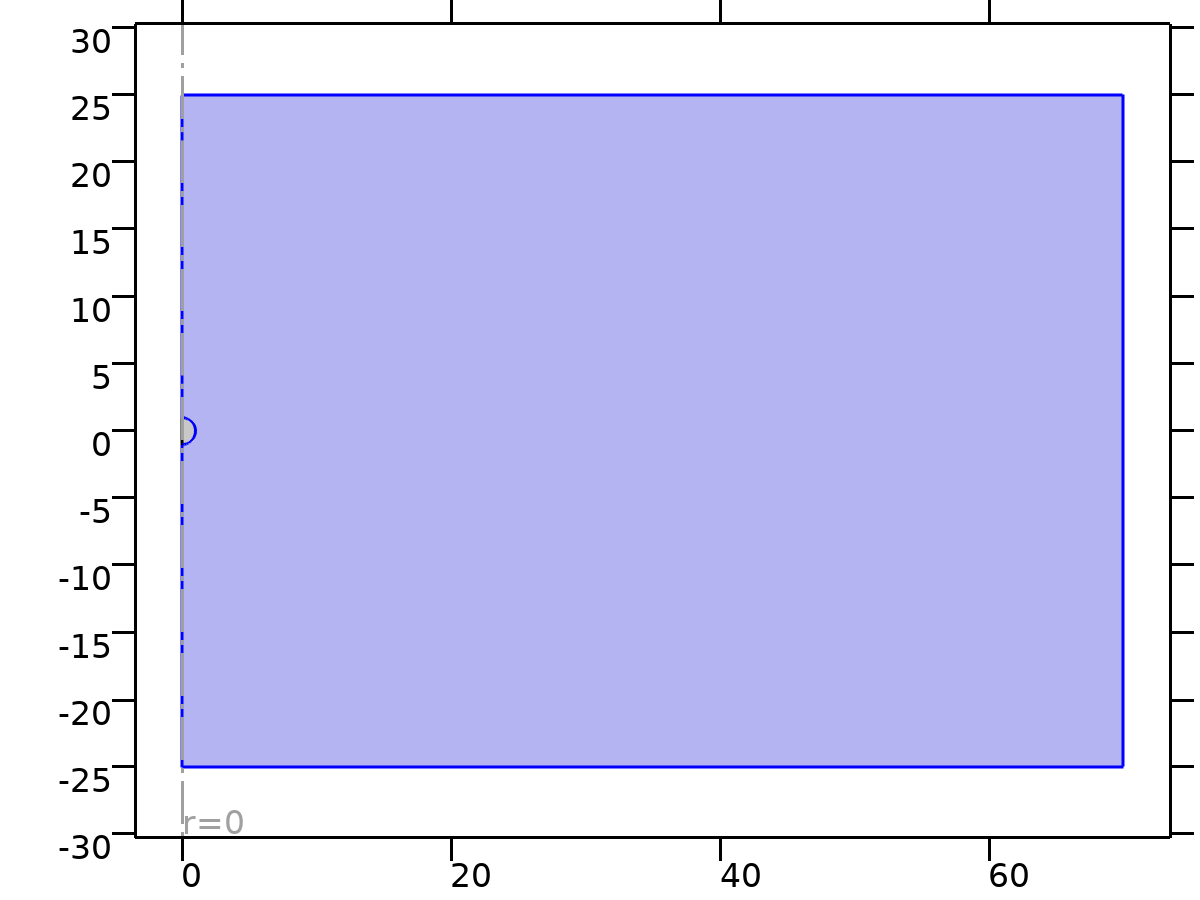
Size

| **Description** | **Value** |
| --- | --- |
| Width | 5 |
| Height | H |

* 1. Laminar Flow

Used products

|  |
| --- |
| COMSOL Multiphysics |



Laminar Flow

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Geometry geom1: Dimension 2: Domain 1 |

Equations





* + 1. Interface Settings

#### Discretization

Settings

| **Description** | **Value** |
| --- | --- |
| Discretization of fluids | P1 + P1 |

#### Physical Model

Settings

| **Description** | **Value** |
| --- | --- |
| Neglect inertial term (Stokes flow) | Off |
| Compressibility | Incompressible flow |
| Swirl flow | Off |
| Enable porous media domains | Off |
| Include gravity | Off |
| Reference temperature | User defined |
| Reference temperature | 293.15[K] |
| Reference pressure level | 1[atm] |

#### Turbulence

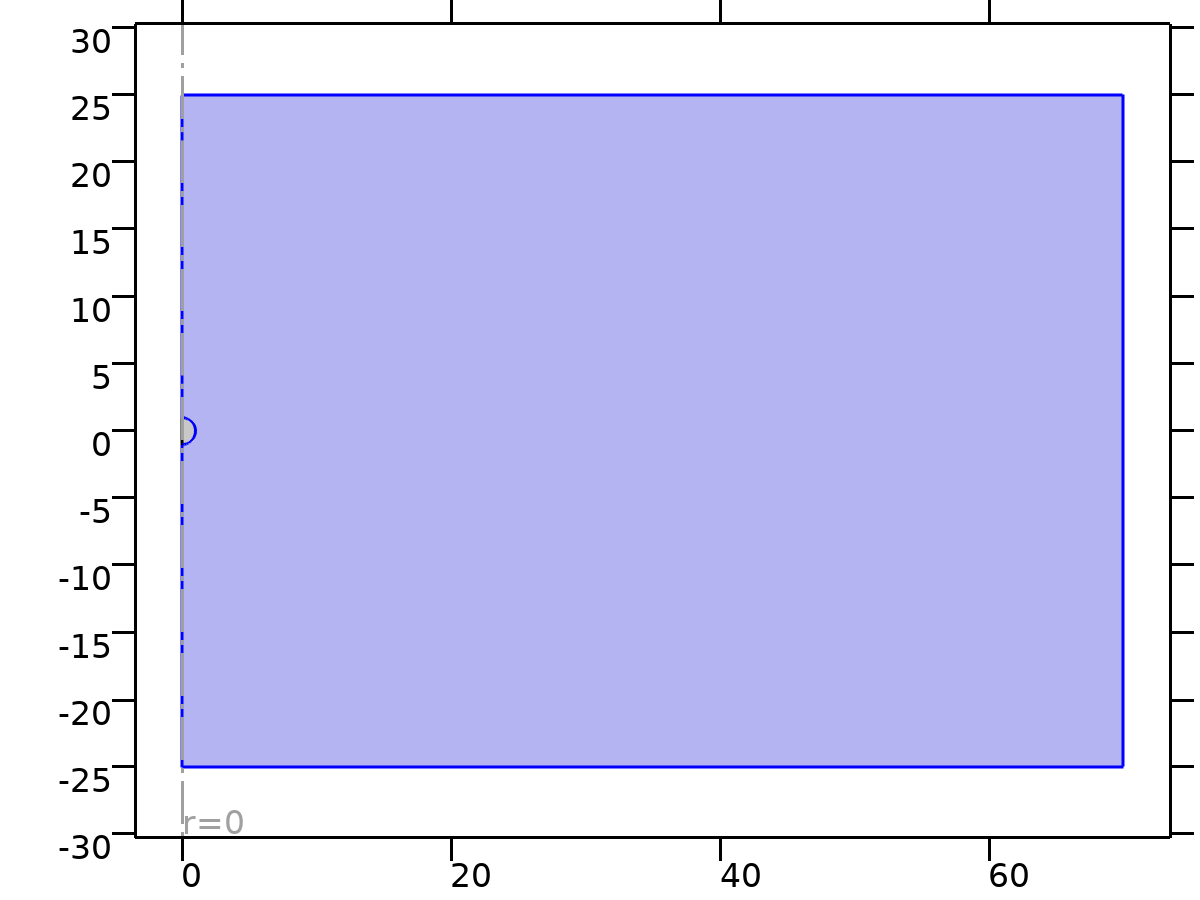
Settings

| **Description** | **Value** |
| --- | --- |
| Turbulence model type | None |

* + 1. Variables

| **Name** | **Expression** | **Description** | **Selection** | **Details** |
| --- | --- | --- | --- | --- |
| spf.Tref | model.input.Tref | Reference temperature | Global | Meta |
| spf.dz | 1 | Thickness | Domain 1 |  |
| spf.pref | 1[atm] | Reference pressure level | Domain 1 |  |
| spf.pA | p+spf.pref | Absolute pressure | Domain 1 |  |
| spf.hasWF | 0 | Help variable | Boundaries 1–2, 5–9 |  |
| spf.dt\_CFL | 1/max(spf.maxop(sqrt(emetric\_spatial(u-d(r,TIME),w-d(z,TIME)))),eps) | Time step, CFL=1 | Global |  |
| spf.Qvd\_tot | spf.intop(2\*spf.Qvd\*pi\*r) | Total viscous dissipation | Global |  |
| spf.K\_stressr | spf.K\_stress\_tensorrr\*spf.nrmesh+spf.K\_stress\_tensorrphi\*spf.nphimesh+spf.K\_stress\_tensorrz\*spf.nzmesh | Viscous force, exterior boundaries, r component | Boundaries 1–2, 5–9 |  |
| spf.K\_stressphi | spf.K\_stress\_tensorphir\*spf.nrmesh+spf.K\_stress\_tensorphiphi\*spf.nphimesh+spf.K\_stress\_tensorphiz\*spf.nzmesh | Viscous force, exterior boundaries, phi component | Boundaries 1–2, 5–9 |  |
| spf.K\_stressz | spf.K\_stress\_tensorzr\*spf.nrmesh+spf.K\_stress\_tensorzphi\*spf.nphimesh+spf.K\_stress\_tensorzz\*spf.nzmesh | Viscous force, exterior boundaries, z component | Boundaries 1–2, 5–9 |  |
| spf.T\_stressr | spf.T\_stress\_tensorrr\*spf.nrmesh+spf.T\_stress\_tensorrphi\*spf.nphimesh+spf.T\_stress\_tensorrz\*spf.nzmesh | Total traction, exterior boundaries, r component | Boundaries 1–2, 5–9 |  |
| spf.T\_stressphi | spf.T\_stress\_tensorphir\*spf.nrmesh+spf.T\_stress\_tensorphiphi\*spf.nphimesh+spf.T\_stress\_tensorphiz\*spf.nzmesh | Total traction, exterior boundaries, phi component | Boundaries 1–2, 5–9 |  |
| spf.T\_stressz | spf.T\_stress\_tensorzr\*spf.nrmesh+spf.T\_stress\_tensorzphi\*spf.nphimesh+spf.T\_stress\_tensorzz\*spf.nzmesh | Total traction, exterior boundaries, z component | Boundaries 1–2, 5–9 |  |
| spf.K\_stress\_dr | down(spf.K\_stress\_tensorrr)\*spf.dnrmesh+down(spf.K\_stress\_tensorrphi)\*spf.dnphimesh+down(spf.K\_stress\_tensorrz)\*spf.dnzmesh | Viscous force, interior boundaries, downside, r component | Boundaries 1–2, 5–7 |  |
| spf.K\_stress\_dphi | down(spf.K\_stress\_tensorphir)\*spf.dnrmesh+down(spf.K\_stress\_tensorphiphi)\*spf.dnphimesh+down(spf.K\_stress\_tensorphiz)\*spf.dnzmesh | Viscous force, interior boundaries, downside, phi component | Boundaries 1–2, 5–7 |  |
| spf.K\_stress\_dz | down(spf.K\_stress\_tensorzr)\*spf.dnrmesh+down(spf.K\_stress\_tensorzphi)\*spf.dnphimesh+down(spf.K\_stress\_tensorzz)\*spf.dnzmesh | Viscous force, interior boundaries, downside, z component | Boundaries 1–2, 5–7 |  |
| spf.K\_stress\_ur | up(spf.K\_stress\_tensorrr)\*spf.unrmesh+up(spf.K\_stress\_tensorrphi)\*spf.unphimesh+up(spf.K\_stress\_tensorrz)\*spf.unzmesh | Viscous force, interior boundaries, upside, r component | Boundaries 8–9 |  |
| spf.K\_stress\_uphi | up(spf.K\_stress\_tensorphir)\*spf.unrmesh+up(spf.K\_stress\_tensorphiphi)\*spf.unphimesh+up(spf.K\_stress\_tensorphiz)\*spf.unzmesh | Viscous force, interior boundaries, upside, phi component | Boundaries 8–9 |  |
| spf.K\_stress\_uz | up(spf.K\_stress\_tensorzr)\*spf.unrmesh+up(spf.K\_stress\_tensorzphi)\*spf.unphimesh+up(spf.K\_stress\_tensorzz)\*spf.unzmesh | Viscous force, interior boundaries, upside, z component | Boundaries 8–9 |  |
| spf.T\_stress\_dr | down(spf.T\_stress\_tensorrr)\*spf.dnrmesh+down(spf.T\_stress\_tensorrphi)\*spf.dnphimesh+down(spf.T\_stress\_tensorrz)\*spf.dnzmesh | Total traction, interior boundaries, downside, r component | Boundaries 1–2, 5–7 |  |
| spf.T\_stress\_dphi | down(spf.T\_stress\_tensorphir)\*spf.dnrmesh+down(spf.T\_stress\_tensorphiphi)\*spf.dnphimesh+down(spf.T\_stress\_tensorphiz)\*spf.dnzmesh | Total traction, interior boundaries, downside, phi component | Boundaries 1–2, 5–7 |  |
| spf.T\_stress\_dz | down(spf.T\_stress\_tensorzr)\*spf.dnrmesh+down(spf.T\_stress\_tensorzphi)\*spf.dnphimesh+down(spf.T\_stress\_tensorzz)\*spf.dnzmesh | Total traction, interior boundaries, downside, z component | Boundaries 1–2, 5–7 |  |
| spf.T\_stress\_ur | up(spf.T\_stress\_tensorrr)\*spf.unrmesh+up(spf.T\_stress\_tensorrphi)\*spf.unphimesh+up(spf.T\_stress\_tensorrz)\*spf.unzmesh | Total traction, interior boundaries, upside, r component | Boundaries 8–9 |  |
| spf.T\_stress\_uphi | up(spf.T\_stress\_tensorphir)\*spf.unrmesh+up(spf.T\_stress\_tensorphiphi)\*spf.unphimesh+up(spf.T\_stress\_tensorphiz)\*spf.unzmesh | Total traction, interior boundaries, upside, phi component | Boundaries 8–9 |  |
| spf.T\_stress\_uz | up(spf.T\_stress\_tensorzr)\*spf.unrmesh+up(spf.T\_stress\_tensorzphi)\*spf.unphimesh+up(spf.T\_stress\_tensorzz)\*spf.unzmesh | Total traction, interior boundaries, upside, z component | Boundaries 8–9 |  |
| spf.usePseudoTimeStepping | 0 | Help variable | Global | + operation |
| spf.localCFLvalue | 1.3^min(niterCMP,9)+if(niterCMP>=25,9\*1.3^min(-25+niterCMP,9),0)+if(niterCMP>=45,90\*1.3^min(-45+niterCMP,9),0) | Local CFL number | Domain 1 |  |
| spf.locCFL | CFLCMP | Local CFL number | Domain 1 |  |
| spf.geometryLengthScale | 12.5 | Geometry length scale | Domain 1 |  |
| spf.time\_step\_inv | max(sqrt(emetric\_spatial(u,w)\*2^gmg\_level^2),spf.nu/spf.geometryLengthScale^2) | Inverse time step | Domain 1 |  |
| spf.tsti | nojac(spf.time\_step\_inv/spf.locCFL) | Help variable | Domain 1 |  |
| spf.nr | unr | Normal vector, r component | Boundaries 8–9 |  |
| spf.nphi | 0 | Normal vector, phi component | Boundaries 8–9 |  |
| spf.nz | unz | Normal vector, z component | Boundaries 8–9 |  |
| spf.nr | dnr | Normal vector, r component | Boundaries 1–2, 5–7 |  |
| spf.nphi | 0 | Normal vector, phi component | Boundaries 1–2, 5–7 |  |
| spf.nz | dnz | Normal vector, z component | Boundaries 1–2, 5–7 |  |
| spf.nrmesh | unrmesh | Normal vector, r component | Boundaries 8–9 |  |
| spf.nphimesh | 0 | Normal vector, phi component | Boundaries 8–9 |  |
| spf.nzmesh | unzmesh | Normal vector, z component | Boundaries 8–9 |  |
| spf.nrmesh | dnrmesh | Normal vector, r component | Boundaries 1–2, 5–7 |  |
| spf.nphimesh | 0 | Normal vector, phi component | Boundaries 1–2, 5–7 |  |
| spf.nzmesh | dnzmesh | Normal vector, z component | Boundaries 1–2, 5–7 |  |

* + 1. Fluid Properties 1

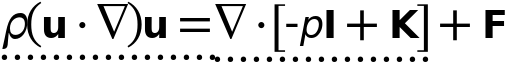


Fluid Properties 1

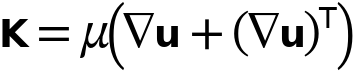
Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Geometry geom1: Dimension 2: All domains |

Equations







#### Fluid Properties

Settings

| **Description** | **Value** |
| --- | --- |
| Density | User defined |
| Density | Re |
|  | Newtonian |
| Dynamic viscosity | User defined |
| Dynamic viscosity | 1 |

#### Variables

| **Name** | **Expression** | **Description** | **Selection** | **Details** |
| --- | --- | --- | --- | --- |
| spf.mu | material.mu | Dynamic viscosity | Domain 1 | Meta |
| spf.rho | material.rho | Density | Domain 1 | Meta |
| spf.Trho | spf.fp1.minput\_temperature | Temperature for density evaluation | Domain 1 |  |
| spf.prho | spf.fp1.minput\_pressure | Pressure for the evaluation of density | Domain 1 |  |
| spf.rhoref | subst(material.rho,minput.T,spf.Tref,minput.pA,spf.pref) | Reference density | Domain 1 | Meta |
| spf.mumat | material.mu | Dynamic viscosity | Domain 1 | Meta |
| spf.srijrr | ur | Strain rate tensor, rr component | Domain 1 |  |
| spf.srijphir | 0 | Strain rate tensor, phir component | Domain 1 |  |
| spf.srijzr | 0.5\*(wr+uz) | Strain rate tensor, zr component | Domain 1 |  |
| spf.srijrphi | 0 | Strain rate tensor, rphi component | Domain 1 |  |
| spf.srijphiphi | if(abs(r)<0.001\*h\_spatial,ur,u/r) | Strain rate tensor, phiphi component | Domain 1 |  |
| spf.srijzphi | 0 | Strain rate tensor, zphi component | Domain 1 |  |
| spf.srijrz | 0.5\*(uz+wr) | Strain rate tensor, rz component | Domain 1 |  |
| spf.srijphiz | 0 | Strain rate tensor, phiz component | Domain 1 |  |
| spf.srijzz | wz | Strain rate tensor, zz component | Domain 1 |  |
| spf.rrijrr | 0 | Rotation rate tensor, rr component | Domain 1 |  |
| spf.rrijphir | 0 | Rotation rate tensor, phir component | Domain 1 |  |
| spf.rrijzr | 0.5\*(wr-uz) | Rotation rate tensor, zr component | Domain 1 |  |
| spf.rrijrphi | 0 | Rotation rate tensor, rphi component | Domain 1 |  |
| spf.rrijphiphi | 0 | Rotation rate tensor, phiphi component | Domain 1 |  |
| spf.rrijzphi | 0 | Rotation rate tensor, zphi component | Domain 1 |  |
| spf.rrijrz | 0.5\*(uz-wr) | Rotation rate tensor, rz component | Domain 1 |  |
| spf.rrijphiz | 0 | Rotation rate tensor, phiz component | Domain 1 |  |
| spf.rrijzz | 0 | Rotation rate tensor, zz component | Domain 1 |  |
| spf.sr | sqrt(2\*spf.srijrr^2+2\*spf.srijrphi^2+2\*spf.srijrz^2+2\*spf.srijphir^2+2\*spf.srijphiphi^2+2\*spf.srijphiz^2+2\*spf.srijzr^2+2\*spf.srijzphi^2+2\*spf.srijzz^2+eps) | Shear rate | Domain 1 |  |
| spf.rr | sqrt(2\*spf.rrijrr^2+2\*spf.rrijrphi^2+2\*spf.rrijrz^2+2\*spf.rrijphir^2+2\*spf.rrijphiphi^2+2\*spf.rrijphiz^2+2\*spf.rrijzr^2+2\*spf.rrijzphi^2+2\*spf.rrijzz^2+eps) | Rotation rate | Domain 1 |  |
| spf.divu | ur+if(abs(r)<0.001\*h\_spatial,ur,u/r)+wz | Divergence of velocity field | Domain 1 |  |
| spf.Fr | 0 | Volume force, r component | Domain 1 | + operation |
| spf.Fphi | 0 | Volume force, phi component | Domain 1 | + operation |
| spf.Fz | 0 | Volume force, z component | Domain 1 | + operation |
| spf.U | sqrt(u^2+w^2) | Velocity magnitude | Domain 1 |  |
| spf.vorticityr | 0 | Vorticity field, r component | Domain 1 |  |
| spf.vorticityphi | -wr+uz | Vorticity field, phi component | Domain 1 |  |
| spf.vorticityz | 0 | Vorticity field, z component | Domain 1 |  |
| spf.vort\_magn | sqrt(spf.vorticityr^2+spf.vorticityphi^2+spf.vorticityz^2) | Vorticity magnitude | Domain 1 |  |
| spf.cellRe | 0.25\*spf.rho\*sqrt(emetric\_spatial(u-d(r,TIME),w-d(z,TIME))/emetric2\_spatial)/spf.mu | Cell Reynolds number | Domain 1 |  |
| spf.nu | spf.mu/spf.rho | Kinematic viscosity | Domain 1 |  |
| spf.betaT | 0 | Isothermal compressibility coefficient | Domain 1 |  |
| spf.Qm | 0 | Source term | Domain 1 | + operation |
| spf.Fgtotr | 0 | Gravity force, r component | Domain 1 | + operation |
| spf.Fgtotphi | 0 | Gravity force, phi component | Domain 1 | + operation |
| spf.Fgtotz | 0 | Gravity force, z component | Domain 1 | + operation |
| spf.mu\_eff | spf.mu+spf.muT | Dynamic viscosity | Domain 1 |  |
| spf.muT | 0 | Turbulent dynamic viscosity | Domain 1 |  |
| spf.T\_stress\_tensorrr | spf.K\_stress\_tensorrr-p | Total stress tensor, rr component | Domain 1 | + operation |
| spf.T\_stress\_tensorphir | spf.K\_stress\_tensorphir | Total stress tensor, phir component | Domain 1 | + operation |
| spf.T\_stress\_tensorzr | spf.K\_stress\_tensorzr | Total stress tensor, zr component | Domain 1 | + operation |
| spf.T\_stress\_tensorrphi | spf.K\_stress\_tensorrphi | Total stress tensor, rphi component | Domain 1 | + operation |
| spf.T\_stress\_tensorphiphi | spf.K\_stress\_tensorphiphi-p | Total stress tensor, phiphi component | Domain 1 | + operation |
| spf.T\_stress\_tensorzphi | spf.K\_stress\_tensorzphi | Total stress tensor, zphi component | Domain 1 | + operation |
| spf.T\_stress\_tensorrz | spf.K\_stress\_tensorrz | Total stress tensor, rz component | Domain 1 | + operation |
| spf.T\_stress\_tensorphiz | spf.K\_stress\_tensorphiz | Total stress tensor, phiz component | Domain 1 | + operation |
| spf.T\_stress\_tensorzz | spf.K\_stress\_tensorzz-p | Total stress tensor, zz component | Domain 1 | + operation |
| spf.K\_stress\_tensorrr | 2\*spf.mu\_eff\*ur | Viscous stress tensor, rr component | Domain 1 | + operation |
| spf.K\_stress\_tensorphir | 0 | Viscous stress tensor, phir component | Domain 1 | + operation |
| spf.K\_stress\_tensorzr | spf.mu\_eff\*(wr+uz) | Viscous stress tensor, zr component | Domain 1 | + operation |
| spf.K\_stress\_tensorrphi | 0 | Viscous stress tensor, rphi component | Domain 1 | + operation |
| spf.K\_stress\_tensorphiphi | 2\*spf.mu\_eff\*if(abs(r)<0.001\*h\_spatial,ur,u/r) | Viscous stress tensor, phiphi component | Domain 1 | + operation |
| spf.K\_stress\_tensorzphi | 0 | Viscous stress tensor, zphi component | Domain 1 | + operation |
| spf.K\_stress\_tensorrz | spf.mu\_eff\*(uz+wr) | Viscous stress tensor, rz component | Domain 1 | + operation |
| spf.K\_stress\_tensorphiz | 0 | Viscous stress tensor, phiz component | Domain 1 | + operation |
| spf.K\_stress\_tensorzz | 2\*spf.mu\_eff\*wz | Viscous stress tensor, zz component | Domain 1 | + operation |
| spf.K\_stress\_tensor\_testrr | 2\*spf.mu\_eff\*test(ur) | Viscous stress tensor test, rr component | Domain 1 | + operation |
| spf.K\_stress\_tensor\_testphir | 0 | Viscous stress tensor test, phir component | Domain 1 | + operation |
| spf.K\_stress\_tensor\_testzr | spf.mu\_eff\*(test(wr)+test(uz)) | Viscous stress tensor test, zr component | Domain 1 | + operation |
| spf.K\_stress\_tensor\_testrphi | 0 | Viscous stress tensor test, rphi component | Domain 1 | + operation |
| spf.K\_stress\_tensor\_testphiphi | 2\*spf.mu\_eff\*if(abs(r)<0.001\*h\_spatial,test(ur),test(u)/r) | Viscous stress tensor test, phiphi component | Domain 1 | + operation |
| spf.K\_stress\_tensor\_testzphi | 0 | Viscous stress tensor test, zphi component | Domain 1 | + operation |
| spf.K\_stress\_tensor\_testrz | spf.mu\_eff\*(test(uz)+test(wr)) | Viscous stress tensor test, rz component | Domain 1 | + operation |
| spf.K\_stress\_tensor\_testphiz | 0 | Viscous stress tensor test, phiz component | Domain 1 | + operation |
| spf.K\_stress\_tensor\_testzz | 2\*spf.mu\_eff\*test(wz) | Viscous stress tensor test, zz component | Domain 1 | + operation |
| spf.upwind\_helpr | u-d(r,TIME) | Upwind term, r component | Domain 1 | + operation |
| spf.upwind\_helpphi | 0 | Upwind term, phi component | Domain 1 | + operation |
| spf.upwind\_helpz | w-d(z,TIME) | Upwind term, z component | Domain 1 | + operation |
| spf.tau\_vdrr | 2\*spf.mu\*spf.srijrr | Viscous stress tensor, rr component | Domain 1 | + operation |
| spf.tau\_vdphir | 2\*spf.mu\*spf.srijphir | Viscous stress tensor, phir component | Domain 1 | + operation |
| spf.tau\_vdzr | 2\*spf.mu\*spf.srijzr | Viscous stress tensor, zr component | Domain 1 | + operation |
| spf.tau\_vdrphi | 2\*spf.mu\*spf.srijrphi | Viscous stress tensor, rphi component | Domain 1 | + operation |
| spf.tau\_vdphiphi | 2\*spf.mu\*spf.srijphiphi | Viscous stress tensor, phiphi component | Domain 1 | + operation |
| spf.tau\_vdzphi | 2\*spf.mu\*spf.srijzphi | Viscous stress tensor, zphi component | Domain 1 | + operation |
| spf.tau\_vdrz | 2\*spf.mu\*spf.srijrz | Viscous stress tensor, rz component | Domain 1 | + operation |
| spf.tau\_vdphiz | 2\*spf.mu\*spf.srijphiz | Viscous stress tensor, phiz component | Domain 1 | + operation |
| spf.tau\_vdzz | 2\*spf.mu\*spf.srijzz | Viscous stress tensor, zz component | Domain 1 | + operation |
| spf.Qvd | spf.tau\_vdrr\*ur+spf.tau\_vdrz\*uz+spf.tau\_vdphiphi\*if(abs(r)<0.001\*h\_spatial,ur,u/r)+spf.tau\_vdzr\*wr+spf.tau\_vdzz\*wz | Viscous dissipation | Domain 1 | + operation |
| spf.epsilon\_p | 1 | Porosity | Domain 1 |  |
| spf.Fst\_tensorrr | 0 | Surface tension force, rr component | Domain 1 | + operation |
| spf.Fst\_tensorphir | 0 | Surface tension force, phir component | Domain 1 | + operation |
| spf.Fst\_tensorzr | 0 | Surface tension force, zr component | Domain 1 | + operation |
| spf.Fst\_tensorrphi | 0 | Surface tension force, rphi component | Domain 1 | + operation |
| spf.Fst\_tensorphiphi | 0 | Surface tension force, phiphi component | Domain 1 | + operation |
| spf.Fst\_tensorzphi | 0 | Surface tension force, zphi component | Domain 1 | + operation |
| spf.Fst\_tensorrz | 0 | Surface tension force, rz component | Domain 1 | + operation |
| spf.Fst\_tensorphiz | 0 | Surface tension force, phiz component | Domain 1 | + operation |
| spf.Fst\_tensorzz | 0 | Surface tension force, zz component | Domain 1 | + operation |
| spf.continuityEquation | spf.rho\*spf.divu | Continuity equation | Domain 1 |  |
| spf.contCoeff | spf.rho | Help variable | Domain 1 |  |
| spf.res\_u | pr+spf.rho\*u\*ur+spf.rho\*w\*uz-(d(2\*ur,r)+if(abs(r)<0.001\*h\_spatial,d(2\*ur,r),2\*ur/r)+d(uz+wr,z)-2\*if(abs(r)<0.001\*h\_spatial,ur,u/r)/r)\*spf.mu-spf.Fr | Equation residual | Domain 1 |  |
| spf.res\_v | -spf.Fphi | Equation residual | Domain 1 |  |
| spf.res\_w | spf.rho\*u\*wr+pz+spf.rho\*w\*wz-(d(wr+uz,r)+if(abs(r)<0.001\*h\_spatial,d(wr+uz,r),(wr+uz)/r)+d(2\*wz,z))\*spf.mu-spf.Fz | Equation residual | Domain 1 |  |
| spf.res\_p | spf.rho\*spf.divu | Pressure equation residual | Domain 1 |  |

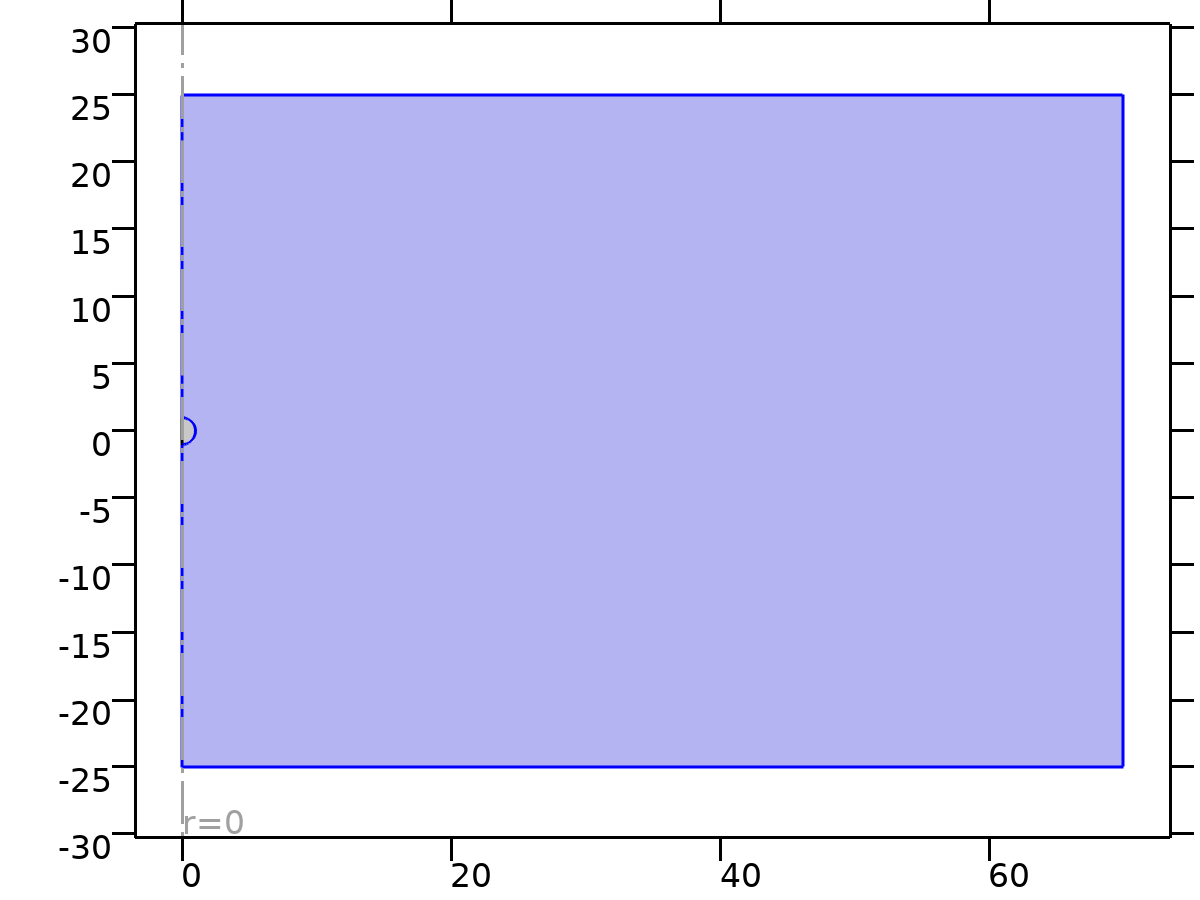
#### Shape functions

| **Name** | **Shape function** | **Description** | **Shape frame** | **Selection** |
| --- | --- | --- | --- | --- |
| u | Lagrange (Linear) | Velocity field, r component | Spatial | Domain 1 |
| w | Lagrange (Linear) | Velocity field, z component | Spatial | Domain 1 |
| p | Lagrange (Linear) | Pressure | Spatial | Domain 1 |

#### Weak Expressions

| **Weak expression** | **Integration order** | **Integration frame** | **Selection** |
| --- | --- | --- | --- |
| 2\*((p-spf.K\_stress\_tensorrr)\*test(ur)-spf.K\_stress\_tensorrz\*test(uz)+(p-spf.K\_stress\_tensorphiphi)\*if(abs(r)<0.001\*h\_spatial,test(ur),test(u)/r)-spf.K\_stress\_tensorzr\*test(wr)+(p-spf.K\_stress\_tensorzz)\*test(wz))\*pi\*r | 2 | Spatial | Domain 1 |
| 2\*(spf.Fr\*test(u)+spf.Fz\*test(w))\*pi\*r | 2 | Spatial | Domain 1 |
| 2\*spf.rho\*(-(d(u,r)\*u+d(u,z)\*w)\*test(u)-(d(w,r)\*u+d(w,z)\*w)\*test(w))\*pi\*r | 2 | Spatial | Domain 1 |
| -2\*spf.continuityEquation\*test(p)\*pi\*r | 2 | Spatial | Domain 1 |
| 2\*spf.streamlinens\*pi\*r | 2 | Spatial | Domain 1 |
| 2\*spf.crosswindns\*pi\*r | 2 | Spatial | Domain 1 |
| 2\*(spf.usePseudoTimeStepping>0)\*spf.rho\*spf.tsti\*(-(u-nojac(u))\*test(u)-(w-nojac(w))\*test(w))\*pi\*r | 2 | Spatial | Domain 1 |

* + 1. Initial Values 1



Initial Values 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Geometry geom1: Dimension 2: All domains |

#### Initial Values

Settings

| **Description** | **Value** |
| --- | --- |
| Velocity field, r component | 0 |
| Velocity field, phi component | 0 |
| Velocity field, z component | 0 |
| Pressure | 0 |

#### Coordinate System Selection

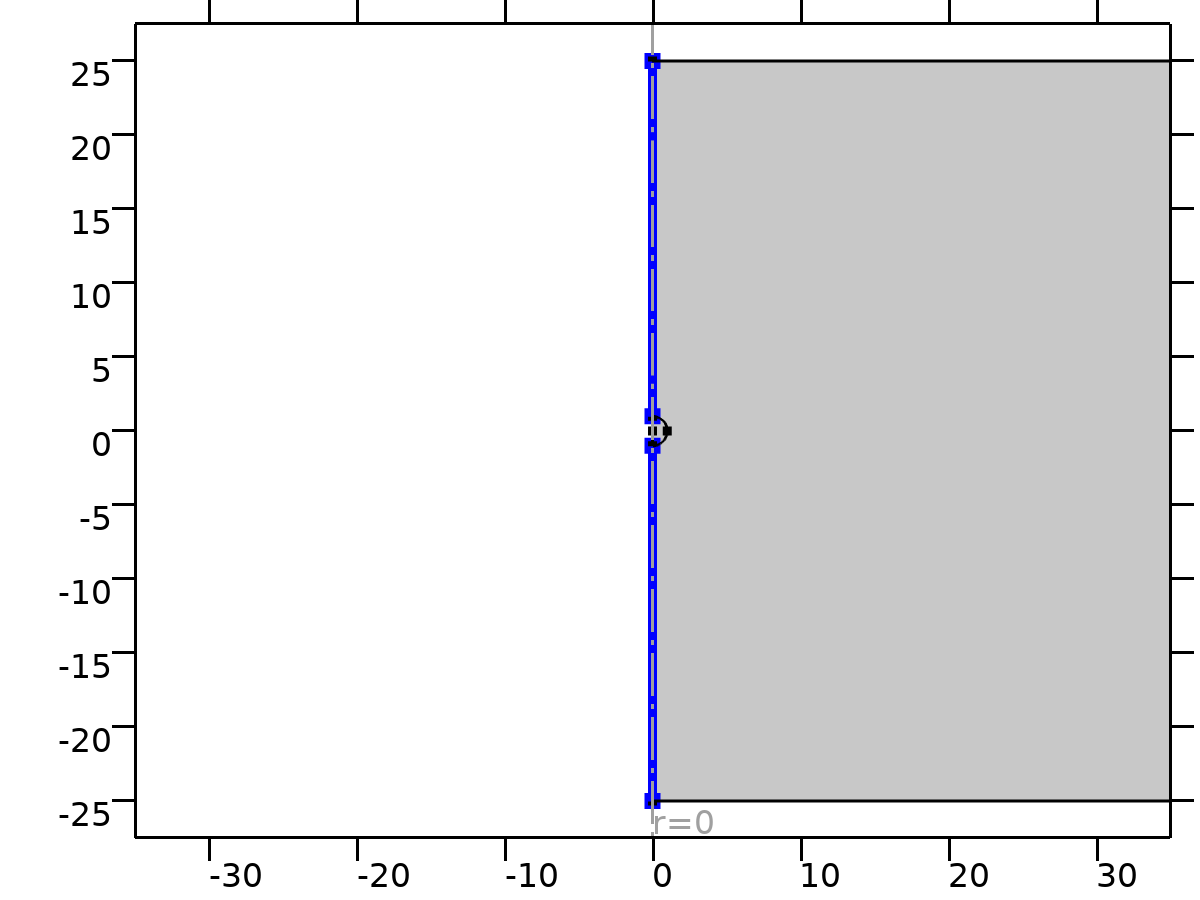
Settings

| **Description** | **Value** |
| --- | --- |
| Coordinate system | Global coordinate system |

#### Variables

| **Name** | **Expression** | **Description** | **Selection** | **Details** |
| --- | --- | --- | --- | --- |
| spf.u\_initr | 0 | Velocity field, r component | Domain 1 |  |
| spf.u\_initphi | 0 | Velocity field, phi component | Domain 1 |  |
| spf.u\_initz | 0 | Velocity field, z component | Domain 1 |  |
| spf.p\_init | 0 | Pressure | Domain 1 |  |

* + 1. Axial Symmetry 1



Axial Symmetry 1

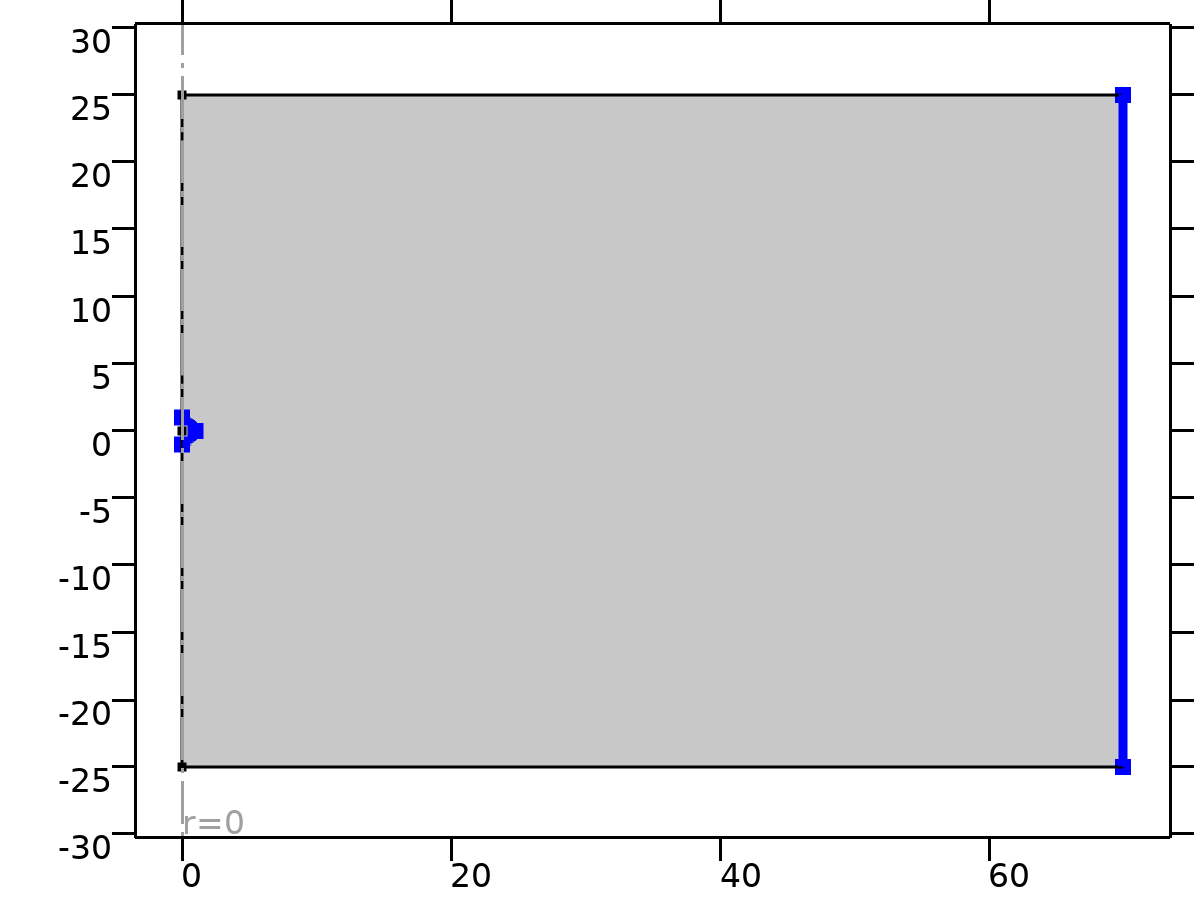
Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Geometry geom1: Dimension 1: All boundaries |

#### Constraints

| **Constraint** | **Constraint force** | **Shape function** | **Selection** | **Details** |
| --- | --- | --- | --- | --- |
| -u | test(-u) | Lagrange (Linear) | Boundaries 1, 5 | Elemental |

* + 1. Wall 1



Wall 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Geometry geom1: Dimension 1: All boundaries |

Equations



#### Boundary Condition

Settings

| **Description** | **Value** |
| --- | --- |
| Wall condition | No slip |

#### Wall Movement

Settings

| **Description** | **Value** |
| --- | --- |
| Translational velocity | Automatic from frame |
| Sliding wall | Off |

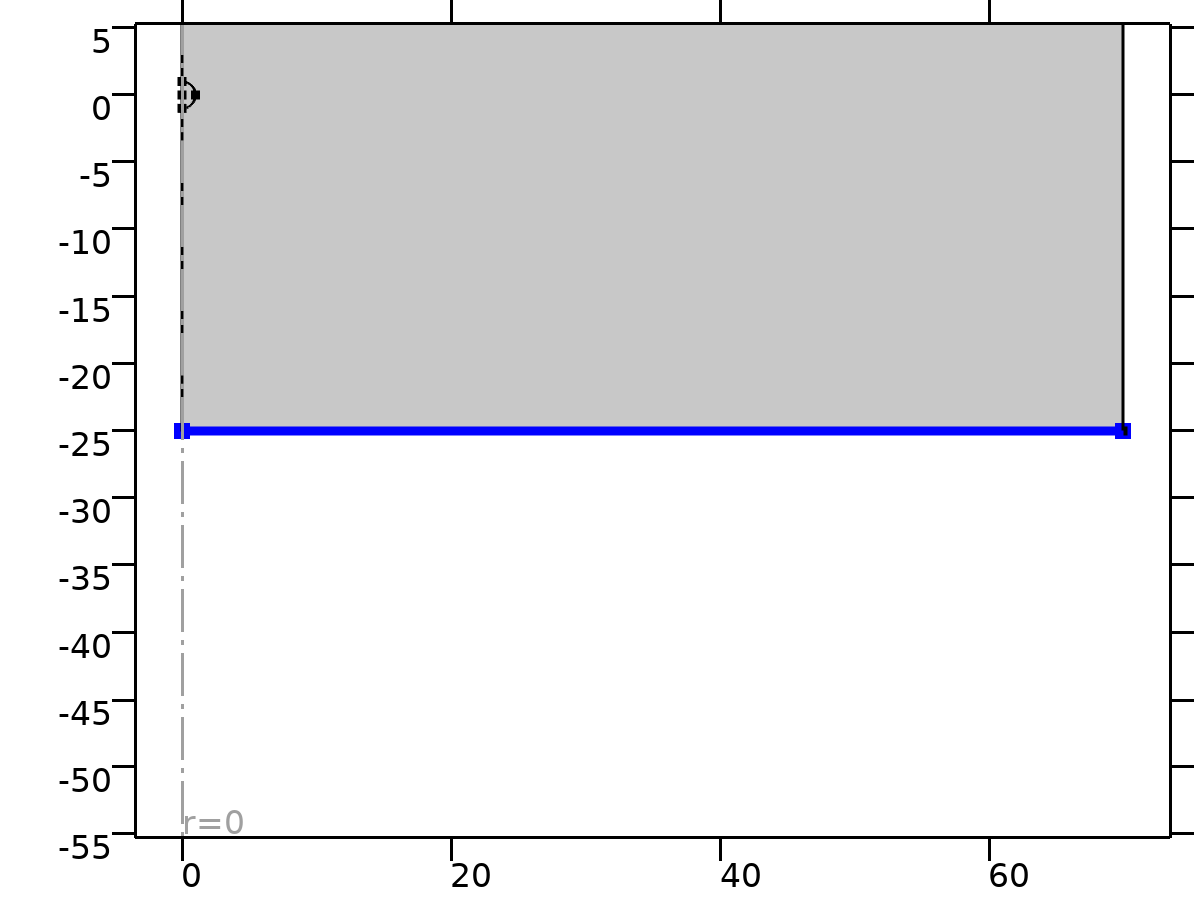
#### Variables

| **Name** | **Expression** | **Description** | **Selection** | **Details** |
| --- | --- | --- | --- | --- |
| spf.ubndr | spf.utrr+spf.usr | Velocity at boundary, r component | Boundaries 7–9 |  |
| spf.ubndphi | spf.utrphi+spf.usphi | Velocity at boundary, phi component | Boundaries 7–9 |  |
| spf.ubndz | spf.utrz+spf.usz | Velocity at boundary, z component | Boundaries 7–9 |  |
| spf.usr | 0 | Velocity of sliding wall, r component | Boundaries 7–9 |  |
| spf.usphi | 0 | Velocity of sliding wall, phi component | Boundaries 7–9 |  |
| spf.usz | 0 | Velocity of sliding wall, z component | Boundaries 7–9 |  |
| spf.utrr | 0 | Velocity of moving wall, r component | Boundaries 7–9 |  |
| spf.utrphi | 0 | Velocity of moving wall, phi component | Boundaries 7–9 |  |
| spf.utrz | 0 | Velocity of moving wall, z component | Boundaries 7–9 |  |
| spf.uLeakager | 0 | Leakage velocity, r component | Boundaries 7–9 | + operation |
| spf.uLeakagephi | 0 | Leakage velocity, phi component | Boundaries 7–9 | + operation |
| spf.uLeakagez | 0 | Leakage velocity, z component | Boundaries 7–9 | + operation |
| spf.noSlipWall | 1 | Help variable | Boundaries 7–9 |  |

#### Constraints

| **Constraint** | **Constraint force** | **Shape function** | **Selection** | **Details** |
| --- | --- | --- | --- | --- |
| -u+spf.ubndr+spf.uLeakager | test(-u) | Lagrange (Linear) | Boundaries 7–9 | Elemental |
| spf.ubndphi+spf.uLeakagephi | 0 |  | Boundaries 7–9 | Elemental |
| -w+spf.ubndz+spf.uLeakagez | test(-w) | Lagrange (Linear) | Boundaries 7–9 | Elemental |

* + 1. Inlet 1



Inlet 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Geometry geom1: Dimension 1: Boundary 2 |

Equations



#### Boundary Condition

Settings

| **Description** | **Value** |
| --- | --- |
| Boundary condition | Velocity |

#### Velocity

Settings

| **Description** | **Value** |
| --- | --- |
| Velocity field componentwise | Velocity field |
| Velocity field, r component | 0 |
| Velocity field, phi component | 0 |
| Velocity field, z component | 1 |

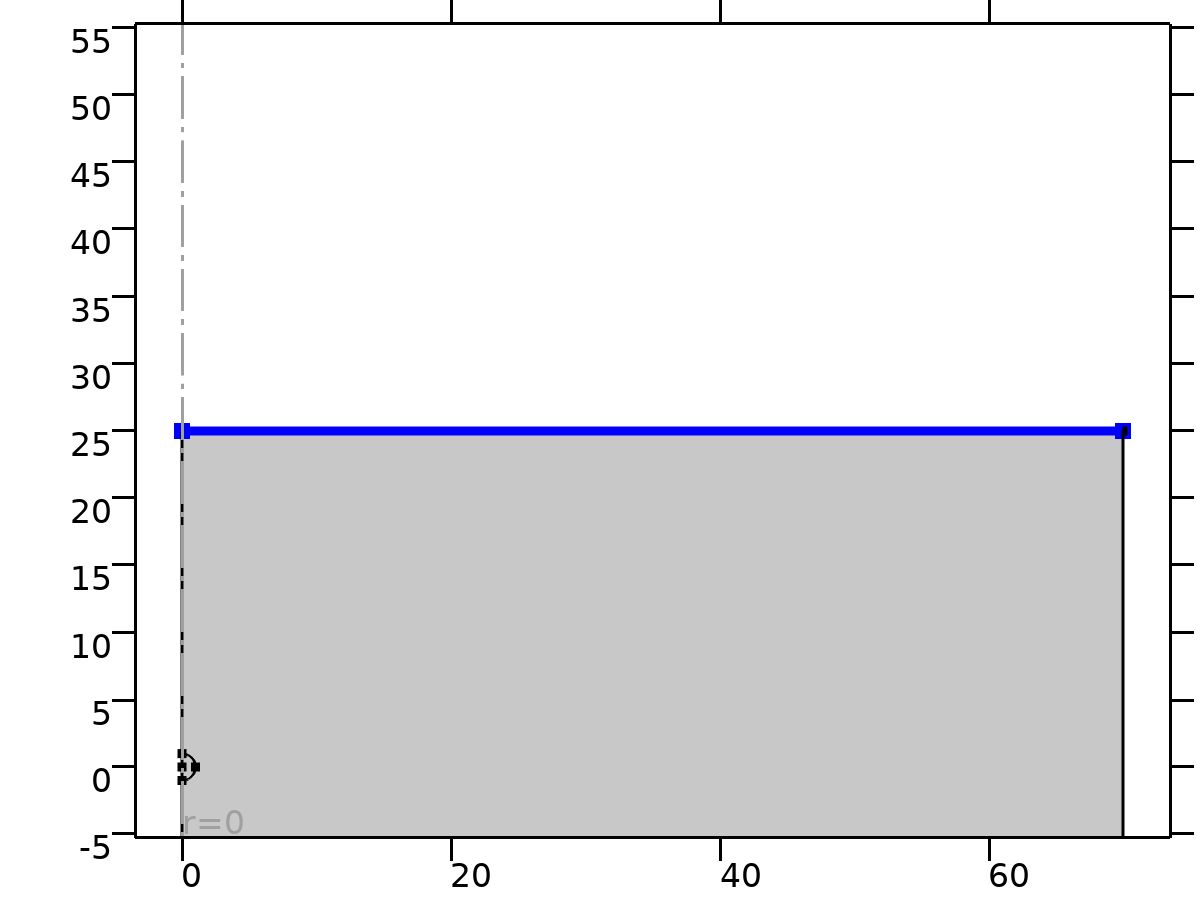
#### Variables

| **Name** | **Expression** | **Description** | **Selection** | **Details** |
| --- | --- | --- | --- | --- |
| spf.u0r | 0 | Velocity field, r component | Boundary 2 |  |
| spf.u0phi | 0 | Velocity field, phi component | Boundary 2 |  |
| spf.u0z | 1 | Velocity field, z component | Boundary 2 |  |
| spf.inl1.dz | spf.dz | Channel thickness | Boundary 2 |  |
| spf.inl1.volumeFlowRate | spf.inl1.intop(2\*(u\*spf.nrmesh+w\*spf.nzmesh)\*pi\*r) | Outward volume flow rate across feature selection | Global |  |
| spf.inl1.massFlowRate | spf.inl1.intop(2\*spf.rho\*(u\*spf.nrmesh+w\*spf.nzmesh)\*pi\*r) | Outward mass flow rate across feature selection | Global |  |
| spf.inl1.pAverage | spf.inl1.intop(2\*p\*pi\*r)/max(spf.inl1.intop(2\*pi\*r),1000\*eps) | Pressure average over feature selection | Global |  |

#### Constraints

| **Constraint** | **Constraint force** | **Shape function** | **Selection** | **Details** |
| --- | --- | --- | --- | --- |
| -u+spf.u0r | test(-u) | Lagrange (Linear) | Boundary 2 | Elemental |
| spf.u0phi | 0 |  | Boundary 2 | Elemental |
| -w+spf.u0z | test(-w) | Lagrange (Linear) | Boundary 2 | Elemental |

* + 1. Outlet 1



Outlet 1

Selection

|  |  |
| --- | --- |
| Geometric entity level | Boundary |
| Selection | Geometry geom1: Dimension 1: Boundary 6 |

Equations





#### Boundary Condition

Settings

| **Description** | **Value** |
| --- | --- |
| Boundary condition | Pressure |

#### Pressure Conditions

Settings

| **Description** | **Value** |
| --- | --- |
| Pressure | Static |
| Pressure | 0 |
| Normal flow | Off |
| Suppress backflow | On |

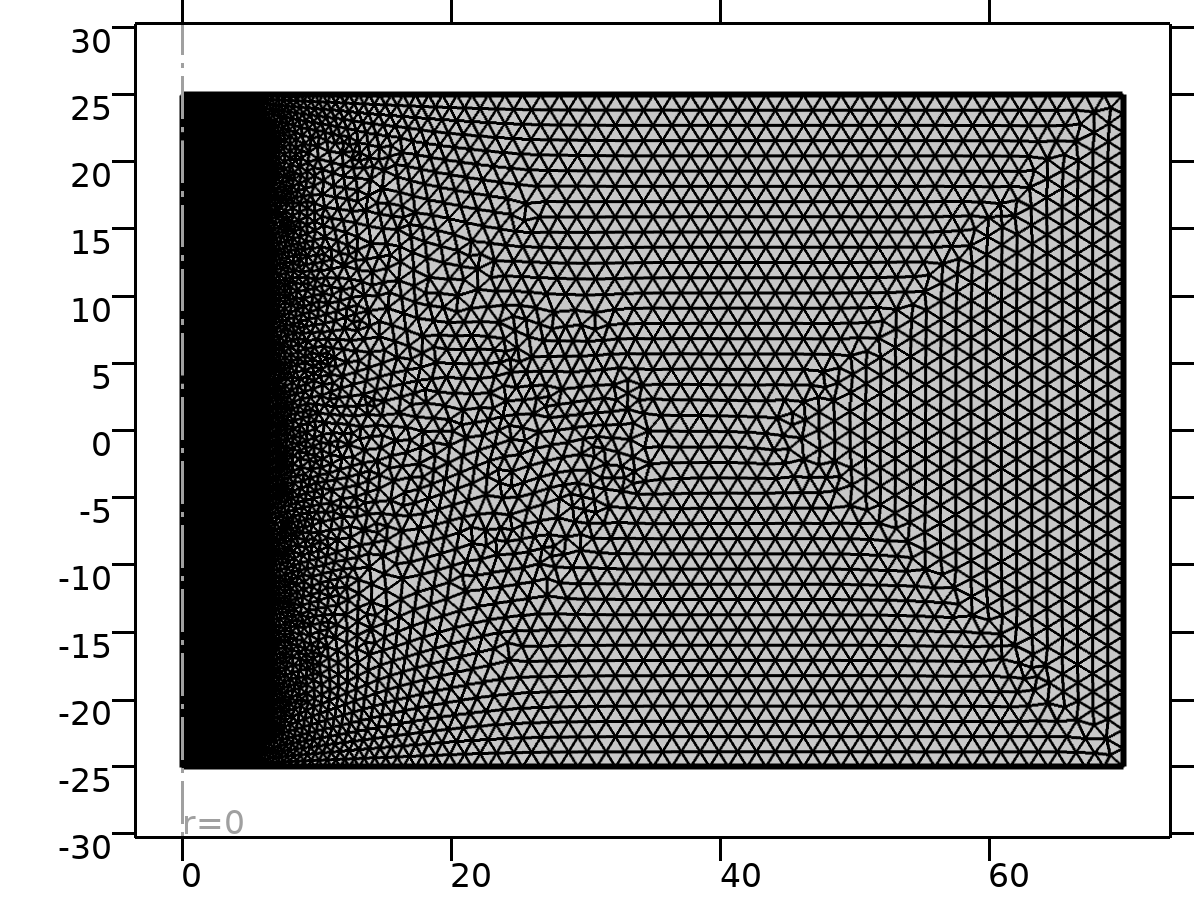
#### Variables

| **Name** | **Expression** | **Description** | **Selection** | **Details** |
| --- | --- | --- | --- | --- |
| spf.meshVol | meshvol\_spatial |  | Boundary 6 |  |
| spf.meshVolInt | down(meshvol\_spatial) | Volume of interior mesh element | Boundary 6 |  |
| spf.c\_here | 96/spf.epsilon\_p | Intermediate variable | Boundary 6 |  |
| spf.rhoFace | down(spf.rho) | Density face value | Boundary 6 |  |
| spf.umxTnFace | spf.upwind\_helpr\*spf.nrmesh+spf.upwind\_helpphi\*spf.nphimesh+spf.upwind\_helpz\*spf.nzmesh | Relative velocity on face | Boundary 6 |  |
| spf.upwind\_ns | spf.backflowPenaltyConv\*spf.uNormal | Upwind term | Boundary 6 |  |
| spf.p0 | 0 | Pressure | Boundary 6 |  |
| spf.out1.Uav | 0 | Average velocity | Global |  |
| spf.out1.p0avfdf | 0 | Average pressure | Global |  |
| spf.out1.dz | spf.dz | Channel thickness | Boundary 6 |  |
| spf.out1.Mflow | spf.out1.massFlowRate | Mass flow | Global |  |
| spf.f0 | spf.p0+spf.uNormal\*(spf.backflowPenaltyDiff-spf.backflowPenaltyConv)\*(spf.uNormal<0) | Normal stress | Boundary 6 |  |
| spf.uNormal | u\*nojac(spf.nrmesh)+w\*nojac(spf.nzmesh) | Normal velocity | Boundary 6 |  |
| spf.backflowPenaltyDiff | spf.c\_here\*min((down(spf.mu)+spf.muT)\*spf.meshVol/spf.meshVolInt,down(spf.rho)\*abs(spf.uNormal)/down(spf.epsilon\_p)) | Backflow penalty parameter, diffusive contribution | Boundary 6 |  |
| spf.backflowPenaltyConv | spf.rhoFace\*spf.umxTnFace/spf.epsilon\_p^2 | Backflow penalty parameter, convective contribution | Boundary 6 |  |
| spf.out1.volumeFlowRate | spf.out1.intop(2\*(u\*spf.nrmesh+w\*spf.nzmesh)\*pi\*r) | Outward volume flow rate across feature selection | Global |  |
| spf.out1.massFlowRate | spf.out1.intop(2\*spf.rho\*(u\*spf.nrmesh+w\*spf.nzmesh)\*pi\*r) | Outward mass flow rate across feature selection | Global |  |
| spf.out1.pAverage | spf.out1.intop(2\*p\*pi\*r)/max(spf.out1.intop(2\*pi\*r),1000\*eps) | Pressure average over feature selection | Global |  |

#### Weak Expressions

| **Weak expression** | **Integration order** | **Integration frame** | **Selection** |
| --- | --- | --- | --- |
| -2\*spf.f0\*(test(u)\*spf.nrmesh+test(w)\*spf.nzmesh)\*pi\*r | 2 | Spatial | Boundary 6 |

* 1. Mesh 1



Mesh 1

Mesh statistics

| **Description** | **Value** |
| --- | --- |
| Minimum element quality | 0.7384 |
| Average element quality | 0.9821 |
| Triangle | 14068 |
| Edge element | 360 |
| Vertex element | 8 |

* + 1. Size (size)

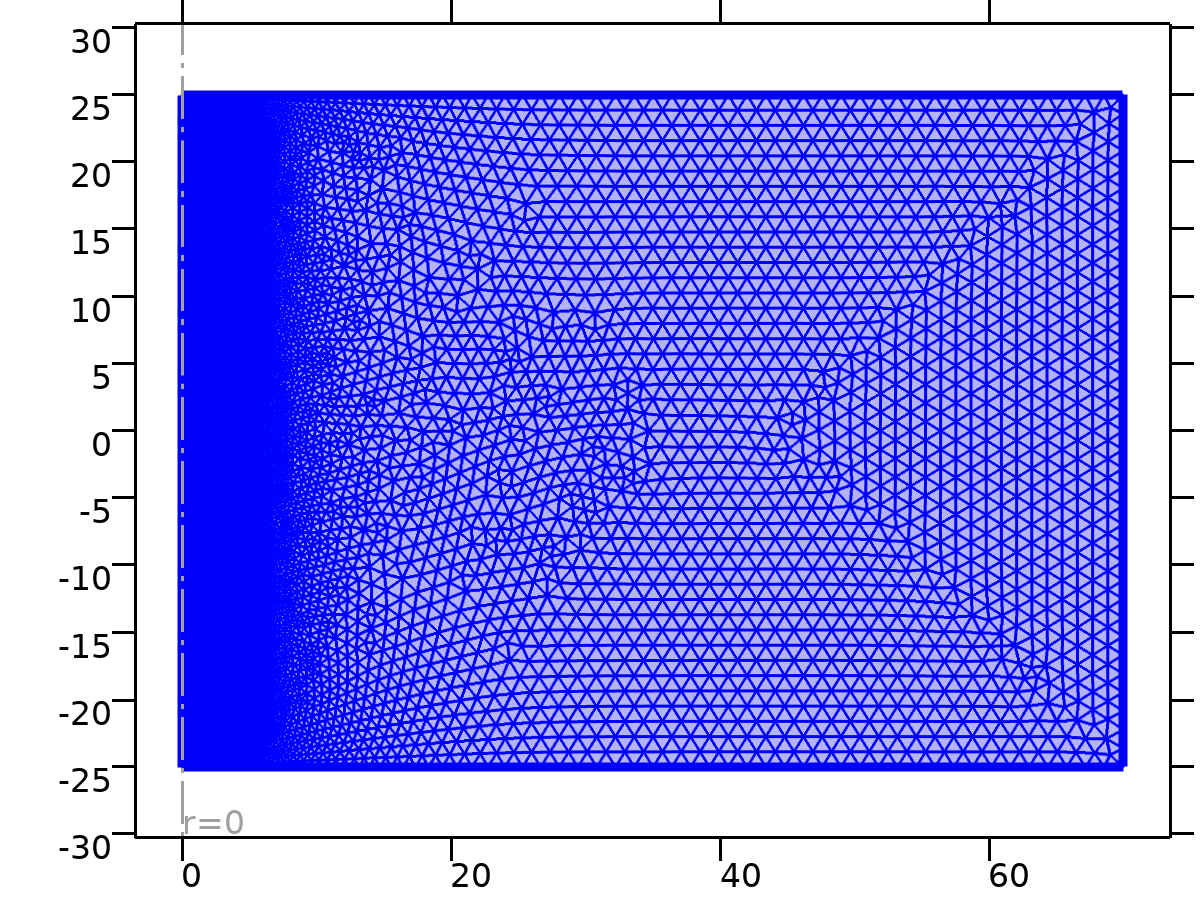
Settings

| **Description** | **Value** |
| --- | --- |
| Calibrate for | Fluid dynamics |
| Maximum element size | 1.4 |
| Minimum element size | 0.02 |
| Curvature factor | 0.25 |
| Predefined size | Finer |

* + 1. Free Triangular 2 (ftri2)

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Remaining |



Free Triangular 2

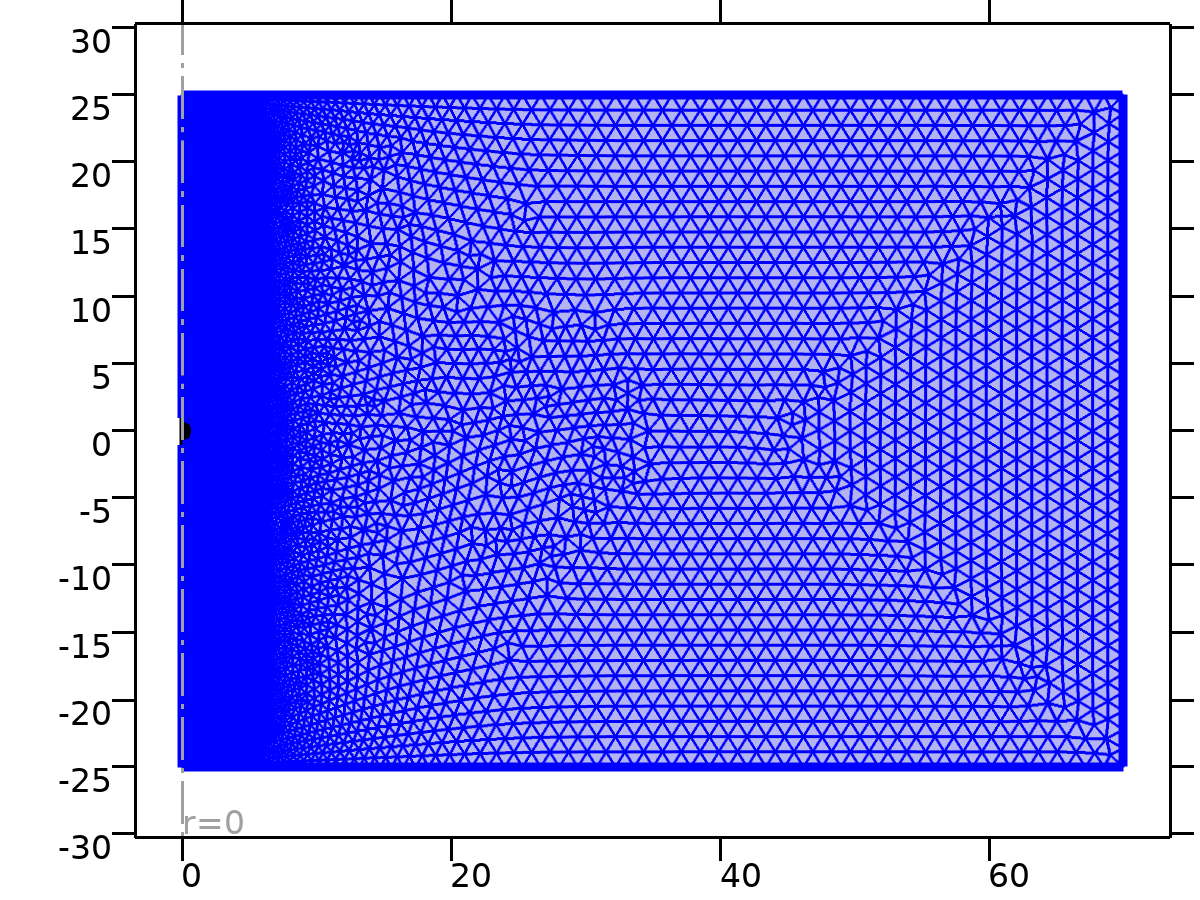
Settings

| **Description** | **Value** |
| --- | --- |
| Number of iterations | 4 |
| Maximum element depth to process | 4 |

#### Size 1 (size1)

Selection

|  |  |
| --- | --- |
| Geometric entity level | Domain |
| Selection | Geometry geom1: Dimension 2: Domain 1 |



Size 1

Settings

| **Description** | **Value** |
| --- | --- |
| Calibrate for | Fluid dynamics |
| Maximum element size | 0.335 |
| Minimum element size | 0.001 |
| Curvature factor | 0.2 |
| Maximum element growth rate | 1.05 |
| Predefined size | Extremely fine |

1. Study 1

Computation information

|  |  |
| --- | --- |
| Computation time | 4 min 46 s |

* 1. Stationary

Study settings

| **Description** | **Value** |
| --- | --- |
| Include geometric nonlinearity | Off |

Study extensions

| **Description** | **Value** |
| --- | --- |
| Auxiliary sweep | On |
| Sweep type | All combinations |

Parameters

| **Parameter name** | **Parameter value list** | **Parameter unit** |
| --- | --- | --- |
| Re | range(0.1,0.1,100) |  |

Physics and variables selection

| **Physics interface** | **Discretization** |
| --- | --- |
| Laminar Flow (spf) | physics |

Mesh selection

| **Geometry** | **Mesh** |
| --- | --- |
| Geometry 1 (geom1) | mesh1 |

* + 1. Study extensions

Study extensions

| **Description** | **Value** |
| --- | --- |
| Auxiliary sweep | On |
| Sweep type | All combinations |

Parameters

| **Parameter name** | **Parameter value list** | **Parameter unit** |
| --- | --- | --- |
| Re | range(0.1,0.1,100) |  |

* 1. Solver Configurations
     1. Solution 1

#### Compile Equations: Stationary (st1)

Study and step

| **Description** | **Value** |
| --- | --- |
| Use study | [Study 1](#cs4702702) |
| Use study step | [Stationary](#cs8195724) |

Log

<---- Compile Equations: Stationary in Study 1/Solution 1 (sol1) ---------------

Started at Nov 24, 2024 1:26:13 AM.

Geometry shape function: Linear Lagrange

Running on AMD64 Family 23 Model 104 Stepping 1, AuthenticAMD.

Using 1 socket with 6 cores in total on DESKTOP-JN273BM.

Available memory: 7.52 GB.

Time: 1 s.

Physical memory: 1.55 GB

Virtual memory: 2.07 GB

Ended at Nov 24, 2024 1:26:14 AM.

----- Compile Equations: Stationary in Study 1/Solution 1 (sol1) -------------->

#### Dependent Variables 1 (v1)

General

| **Description** | **Value** |
| --- | --- |
| Defined by study step | [Stationary](#cs8195724) |

Initial value calculation constants

| **Constant name** | **Initial value source** |
| --- | --- |
| Re | range(0.1,0.1,100) |

Log

<---- Dependent Variables 1 in Study 1/Solution 1 (sol1) -----------------------

Started at Nov 24, 2024 1:26:14 AM.

Solution time: 0 s.

Physical memory: 1.55 GB

Virtual memory: 2.07 GB

Ended at Nov 24, 2024 1:26:14 AM.

----- Dependent Variables 1 in Study 1/Solution 1 (sol1) ---------------------->

##### Pressure (comp1.p) (comp1\_p)

General

| **Description** | **Value** |
| --- | --- |
| Field components | comp1.p |

##### Velocity field (comp1.u) (comp1\_u)

General

| **Description** | **Value** |
| --- | --- |
| Field components | {comp1.u, comp1.w} |
| Internal variables | comp1.spf.isFluidHasBeenSolved |

#### Stationary Solver 1 (s1)

General

| **Description** | **Value** |
| --- | --- |
| Defined by study step | [Stationary](#cs8195724) |

Results while solving

| **Description** | **Value** |
| --- | --- |
| Probes | None |

Log

Continuation parameter Re = 86.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.6e+02   1.0000000     0.00024 4303  865 2589  1.2e-15  2.9e-15

Continuation parameter Re = 86.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.6e+02   1.0000000     0.00024 4308  866 2592    2e-15    3e-15

Continuation parameter Re = 86.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.7e-05     4.6e+02   1.0000000     0.00024 4313  867 2595  2.1e-15  3.2e-15

Continuation parameter Re = 86.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.3e-05     4.6e+02   1.0000000     0.00025 4318  868 2598  3.4e-15    3e-15

Continuation parameter Re = 86.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.3e-05     4.6e+02   1.0000000     0.00025 4323  869 2601  1.9e-15  2.9e-15

Continuation parameter Re = 86.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.3e-05     4.7e+02   1.0000000     0.00025 4328  870 2604  3.4e-15  3.2e-15

Continuation parameter Re = 86.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.3e-05     4.7e+02   1.0000000     0.00025 4333  871 2607  2.5e-15  2.9e-15

Continuation parameter Re = 86.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.3e-05     4.7e+02   1.0000000     0.00025 4338  872 2610    2e-15  2.8e-15

Continuation parameter Re = 86.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.3e-05     4.7e+02   1.0000000     0.00025 4343  873 2613  2.4e-15  3.2e-15

Continuation parameter Re = 86.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.3e-05     4.7e+02   1.0000000     0.00025 4348  874 2616  1.6e-15    3e-15

Continuation parameter Re = 87.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.3e-05     4.7e+02   1.0000000     0.00025 4353  875 2619  1.7e-15  3.2e-15

Continuation parameter Re = 87.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.5e-05     4.6e+02   1.0000000     0.00023 4358  876 2622  2.9e-15  3.3e-15

Continuation parameter Re = 87.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.7e+02   1.0000000     0.00024 4363  877 2625  1.7e-15  3.2e-15

Continuation parameter Re = 87.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.7e+02   1.0000000     0.00024 4368  878 2628  3.3e-15  3.2e-15

Continuation parameter Re = 87.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.7e+02   1.0000000     0.00024 4373  879 2631  1.4e-15  3.2e-15

Continuation parameter Re = 87.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.7e+02   1.0000000     0.00024 4378  880 2634  2.3e-15  3.2e-15

Continuation parameter Re = 87.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.3e-05     4.7e+02   1.0000000     0.00024 4383  881 2637  1.4e-15  3.5e-15

Continuation parameter Re = 87.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.6e-05     4.7e+02   1.0000000     0.00038 4388  882 2640  1.3e-15  2.3e-15

Continuation parameter Re = 87.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.7e+02   1.0000000     0.00024 4393  883 2643  3.5e-15  3.1e-15

Continuation parameter Re = 87.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.7e+02   1.0000000     0.00024 4398  884 2646  2.2e-15  3.5e-15

Continuation parameter Re = 88.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.7e+02   1.0000000     0.00024 4403  885 2649  2.3e-15  3.3e-15

Continuation parameter Re = 88.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.4e-05     4.7e+02   1.0000000     0.00027 4408  886 2652  2.3e-15  3.4e-15

Continuation parameter Re = 88.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.8e+02   1.0000000     0.00024 4413  887 2655  1.7e-15  3.2e-15

Continuation parameter Re = 88.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.8e+02   1.0000000     0.00024 4418  888 2658  1.4e-15  3.3e-15

Continuation parameter Re = 88.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.8e+02   1.0000000     0.00024 4423  889 2661  1.4e-15  3.3e-15

Continuation parameter Re = 88.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     6.4e-05     4.8e+02   1.0000000     0.00024 4428  890 2664  1.4e-15  2.2e-15

Continuation parameter Re = 88.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.8e+02   1.0000000     0.00024 4433  891 2667  4.9e-15  3.3e-15

Continuation parameter Re = 88.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     5.2e-05     4.8e+02   1.0000000     0.00024 4438  892 2670  2.5e-15  3.4e-15

Continuation parameter Re = 88.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.9e-05     4.5e+02   1.0000000     0.00023 4443  893 2673    2e-15  3.1e-15

Continuation parameter Re = 88.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.9e-05     4.2e+02   1.0000000     0.00024 4448  894 2676  2.4e-15  3.1e-15

Continuation parameter Re = 89.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.7e-05     4.1e+02   1.0000000     0.00023 4453  895 2679  1.7e-15    3e-15

Continuation parameter Re = 89.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.6e-05     4.1e+02   1.0000000     0.00023 4458  896 2682  1.3e-15  3.2e-15

Continuation parameter Re = 89.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.6e-05     4.1e+02   1.0000000     0.00023 4463  897 2685  1.6e-15  2.9e-15

Continuation parameter Re = 89.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.6e-05     4.1e+02   1.0000000     0.00023 4468  898 2688  2.4e-15  2.9e-15

Continuation parameter Re = 89.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.6e-05     4.1e+02   1.0000000     0.00023 4473  899 2691  1.3e-15  3.1e-15

Continuation parameter Re = 89.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.5e-05     4.1e+02   1.0000000     0.00023 4478  900 2694    3e-15  3.2e-15

Continuation parameter Re = 89.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.5e-05     4.1e+02   1.0000000     0.00023 4483  901 2697  1.8e-15  3.2e-15

Continuation parameter Re = 89.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.5e-05     4.1e+02   1.0000000     0.00023 4488  902 2700  3.7e-15  3.2e-15

Continuation parameter Re = 89.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.5e-05     4.1e+02   1.0000000     0.00023 4493  903 2703  2.3e-15  2.8e-15

Continuation parameter Re = 89.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.5e-05     4.1e+02   1.0000000     0.00023 4498  904 2706  2.1e-15  2.9e-15

Continuation parameter Re = 90.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.4e-05     4.1e+02   1.0000000     0.00023 4503  905 2709  2.7e-15  3.1e-15

Continuation parameter Re = 90.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.5e-05     4.1e+02   1.0000000     0.00023 4508  906 2712  3.1e-15  3.2e-15

Continuation parameter Re = 90.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.4e-05     4.1e+02   1.0000000     0.00023 4513  907 2715  1.8e-15  2.7e-15

Continuation parameter Re = 90.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.3e-05     4.1e+02   1.0000000     0.00023 4518  908 2718  3.1e-15  2.7e-15

Continuation parameter Re = 90.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     4.1e+02   1.0000000     0.00023 4523  909 2721    2e-15    3e-15

Continuation parameter Re = 90.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     4.2e+02   1.0000000     0.00023 4528  910 2724  2.8e-15    3e-15

Continuation parameter Re = 90.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.3e-05     4.1e+02   1.0000000     0.00023 4533  911 2727    2e-15  2.9e-15

Continuation parameter Re = 90.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05       4e+02   1.0000000     0.00023 4538  912 2730    3e-15  3.1e-15

Continuation parameter Re = 90.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05       4e+02   1.0000000     0.00023 4543  913 2733  2.7e-15  3.3e-15

Continuation parameter Re = 90.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05       4e+02   1.0000000     0.00023 4548  914 2736  2.3e-15  3.1e-15

Continuation parameter Re = 91.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05       4e+02   1.0000000     0.00022 4553  915 2739  2.4e-15  2.6e-15

Continuation parameter Re = 91.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.3e-05       4e+02   1.0000000     0.00023 4558  916 2742  1.5e-15  1.5e-15

Continuation parameter Re = 91.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4563  917 2745    2e-15  2.8e-15

Continuation parameter Re = 91.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4568  918 2748    3e-15  2.9e-15

Continuation parameter Re = 91.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4573  919 2751  1.2e-15  2.8e-15

Continuation parameter Re = 91.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4578  920 2754  1.5e-15  3.1e-15

Continuation parameter Re = 91.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.3e-05     3.9e+02   1.0000000     0.00023 4583  921 2757  1.8e-15  3.4e-15

Continuation parameter Re = 91.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4588  922 2760  1.9e-15    3e-15

Continuation parameter Re = 91.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4593  923 2763  2.2e-15  3.2e-15

Continuation parameter Re = 91.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4598  924 2766  2.7e-15  3.1e-15

Continuation parameter Re = 92.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4603  925 2769  2.5e-15    3e-15

Continuation parameter Re = 92.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4608  926 2772  1.6e-15  3.2e-15

Continuation parameter Re = 92.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4613  927 2775  3.2e-15    3e-15

Continuation parameter Re = 92.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.2e-05     3.9e+02   1.0000000     0.00022 4618  928 2778  2.9e-15  3.1e-15

Continuation parameter Re = 92.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05     3.9e+02   1.0000000     0.00022 4623  929 2781  4.4e-15  2.9e-15

Continuation parameter Re = 92.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05     3.9e+02   1.0000000     0.00022 4628  930 2784  2.2e-15  2.8e-15

Continuation parameter Re = 92.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05     3.9e+02   1.0000000     0.00022 4633  931 2787  3.4e-15    3e-15

Continuation parameter Re = 92.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05     3.9e+02   1.0000000     0.00022 4638  932 2790  2.5e-15  3.1e-15

Continuation parameter Re = 92.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05     3.9e+02   1.0000000     0.00022 4643  933 2793  2.3e-15  3.3e-15

Continuation parameter Re = 92.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05     3.9e+02   1.0000000     0.00022 4648  934 2796  2.2e-15  3.2e-15

Continuation parameter Re = 93.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05     3.9e+02   1.0000000     0.00022 4653  935 2799  1.5e-15  3.3e-15

Continuation parameter Re = 93.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05     3.9e+02   1.0000000     0.00022 4658  936 2802  2.6e-15  3.5e-15

Continuation parameter Re = 93.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05       4e+02   1.0000000     0.00022 4663  937 2805  1.7e-15    3e-15

Continuation parameter Re = 93.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05       4e+02   1.0000000     0.00022 4668  938 2808  2.1e-15    3e-15

Continuation parameter Re = 93.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05       4e+02   1.0000000     0.00022 4673  939 2811    3e-15  2.8e-15

Continuation parameter Re = 93.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05       4e+02   1.0000000     0.00022 4678  940 2814  2.2e-15  3.3e-15

Continuation parameter Re = 93.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05       4e+02   1.0000000     0.00022 4683  941 2817  1.9e-15  3.4e-15

Continuation parameter Re = 93.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05       4e+02   1.0000000     0.00022 4688  942 2820  2.1e-15    3e-15

Continuation parameter Re = 93.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05       4e+02   1.0000000     0.00022 4693  943 2823  1.5e-15  3.2e-15

Continuation parameter Re = 93.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1       4e-05       4e+02   1.0000000     0.00022 4698  944 2826  1.8e-15  3.1e-15

Continuation parameter Re = 94.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1       4e-05       4e+02   1.0000000     0.00022 4703  945 2829  2.8e-15  3.1e-15

Continuation parameter Re = 94.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1       4e-05       4e+02   1.0000000     0.00022 4708  946 2832  3.6e-15    3e-15

Continuation parameter Re = 94.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1       4e-05       4e+02   1.0000000     0.00022 4713  947 2835    2e-15    3e-15

Continuation parameter Re = 94.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.9e-05       4e+02   1.0000000     0.00022 4718  948 2838  1.2e-15  2.9e-15

Continuation parameter Re = 94.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.9e-05       4e+02   1.0000000     0.00022 4723  949 2841  1.1e-15  3.1e-15

Continuation parameter Re = 94.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.9e-05       4e+02   1.0000000     0.00022 4728  950 2844  2.3e-15  3.5e-15

Continuation parameter Re = 94.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.8e-05       4e+02   1.0000000     0.00022 4733  951 2847  2.4e-15  3.1e-15

Continuation parameter Re = 94.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.8e-05       4e+02   1.0000000     0.00022 4738  952 2850  3.5e-15  3.1e-15

Continuation parameter Re = 94.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.8e-05       4e+02   1.0000000     0.00022 4743  953 2853  2.6e-15  3.2e-15

Continuation parameter Re = 94.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.8e-05       4e+02   1.0000000     0.00022 4748  954 2856  1.6e-15  3.2e-15

Continuation parameter Re = 95.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.8e-05       4e+02   1.0000000     0.00022 4753  955 2859  2.8e-15  3.3e-15

Continuation parameter Re = 95.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.8e-05       4e+02   1.0000000     0.00022 4758  956 2862  2.4e-15  3.3e-15

Continuation parameter Re = 95.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.7e-05       4e+02   1.0000000     0.00022 4763  957 2865  1.7e-15  3.1e-15

Continuation parameter Re = 95.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.8e-05       4e+02   1.0000000     0.00022 4768  958 2868  2.4e-15  2.9e-15

Continuation parameter Re = 95.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.7e-05       4e+02   1.0000000     0.00022 4773  959 2871  2.3e-15  2.9e-15

Continuation parameter Re = 95.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.7e-05       4e+02   1.0000000     0.00022 4778  960 2874  3.1e-15  3.2e-15

Continuation parameter Re = 95.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.6e-05       4e+02   1.0000000     0.00022 4783  961 2877  2.4e-15  3.1e-15

Continuation parameter Re = 95.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.6e-05     3.9e+02   1.0000000     0.00022 4788  962 2880  1.7e-15    3e-15

Continuation parameter Re = 95.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     3.9e+02   1.0000000     0.00022 4793  963 2883  1.6e-15  2.9e-15

Continuation parameter Re = 95.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00022 4798  964 2886  2.5e-15  3.1e-15

Continuation parameter Re = 96.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00022 4803  965 2889  2.8e-15  2.8e-15

Continuation parameter Re = 96.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00022 4808  966 2892    2e-15  3.3e-15

Continuation parameter Re = 96.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00022 4813  967 2895  2.2e-15    3e-15

Continuation parameter Re = 96.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00022 4818  968 2898  1.5e-15    3e-15

Continuation parameter Re = 96.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00022 4823  969 2901  3.8e-15  3.1e-15

Continuation parameter Re = 96.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4828  970 2904  3.4e-15    3e-15

Continuation parameter Re = 96.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4833  971 2907  3.7e-15  3.2e-15

Continuation parameter Re = 96.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4838  972 2910  1.7e-15    3e-15

Continuation parameter Re = 96.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4843  973 2913  2.8e-15  2.9e-15

Continuation parameter Re = 96.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4848  974 2916  1.6e-15  2.9e-15

Continuation parameter Re = 97.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4853  975 2919  2.6e-15  3.2e-15

Continuation parameter Re = 97.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4858  976 2922  2.3e-15    3e-15

Continuation parameter Re = 97.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4863  977 2925  2.3e-15    3e-15

Continuation parameter Re = 97.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4868  978 2928  2.1e-15  3.3e-15

Continuation parameter Re = 97.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4873  979 2931  2.9e-15  3.2e-15

Continuation parameter Re = 97.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4878  980 2934  2.6e-15  3.2e-15

Continuation parameter Re = 97.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4883  981 2937  1.7e-15  3.2e-15

Continuation parameter Re = 97.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05       4e+02   1.0000000     0.00021 4888  982 2940  3.1e-15  3.1e-15

Continuation parameter Re = 97.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.1e+02   1.0000000     0.00021 4893  983 2943  1.6e-15  3.1e-15

Continuation parameter Re = 97.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.1e+02   1.0000000     0.00021 4898  984 2946  2.9e-15  2.8e-15

Continuation parameter Re = 98.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.1e+02   1.0000000     0.00021 4903  985 2949  3.4e-15  3.1e-15

Continuation parameter Re = 98.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.4e-05     4.1e+02   1.0000000     0.00021 4908  986 2952  1.8e-15    3e-15

Continuation parameter Re = 98.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.4e-05     4.1e+02   1.0000000     0.00021 4913  987 2955  4.6e-15  3.2e-15

Continuation parameter Re = 98.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.4e-05     4.1e+02   1.0000000     0.00021 4918  988 2958  2.9e-15    3e-15

Continuation parameter Re = 98.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.1e+02   1.0000000      0.0002 4923  989 2961  4.5e-15  3.2e-15

Continuation parameter Re = 98.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.6e-05     4.1e+02   1.0000000      0.0002 4928  990 2964  5.9e-15    3e-15

Continuation parameter Re = 98.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.6e-05     4.1e+02   1.0000000      0.0002 4933  991 2967  2.1e-15  2.9e-15

Continuation parameter Re = 98.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     4.1e-05     4.1e+02   1.0000000      0.0002 4938  992 2970  2.9e-15  2.2e-15

Continuation parameter Re = 98.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.6e-05     4.2e+02   1.0000000     0.00021 4943  993 2973    5e-15  3.5e-15

Continuation parameter Re = 98.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.6e-05     4.2e+02   1.0000000      0.0002 4948  994 2976  2.4e-15    3e-15

Continuation parameter Re = 99.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 4953  995 2979  3.8e-15  3.3e-15

Continuation parameter Re = 99.1.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 4958  996 2982  1.7e-15    3e-15

Continuation parameter Re = 99.2.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 4963  997 2985  1.4e-15  3.2e-15

Continuation parameter Re = 99.3.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 4968  998 2988  1.5e-15  3.1e-15

Continuation parameter Re = 99.4.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 4973  999 2991  3.1e-15  3.1e-15

Continuation parameter Re = 99.5.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 4978 1000 2994  2.5e-15  3.2e-15

Continuation parameter Re = 99.6.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 4983 1001 2997  1.6e-15  3.1e-15

Continuation parameter Re = 99.7.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 4988 1002 3000  2.8e-15    3e-15

Continuation parameter Re = 99.8.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 4993 1003 3003  3.6e-15  2.9e-15

Continuation parameter Re = 99.9.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 4998 1004 3006  4.1e-15    3e-15

Continuation parameter Re = 100.

Iter      SolEst      ResEst     Damping    Stepsize #Res #Jac #Sol   LinErr   LinRes

   1     3.5e-05     4.2e+02   1.0000000      0.0002 5003 1005 3009  5.8e-15  3.1e-15

Solution time: 284 s. (4 minutes, 44 seconds)

Physical memory: 1.63 GB

Virtual memory: 2.15 GB

Ended at Nov 24, 2024 1:30:59 AM.

----- Stationary Solver 1 in Study 1/Solution 1 (sol1) ------------------------>

##### Advanced (aDef)

Assembly settings

| **Description** | **Value** |
| --- | --- |
| Reuse sparsity pattern | On |

##### Parametric 1 (p1)

General

| **Description** | **Value** |
| --- | --- |
| Defined by study step | [Stationary](#cs8195724) |
| Sweep type | All combinations |

Parameters

| **Parameter name** | **Parameter value list** | **Parameter unit** |
| --- | --- | --- |
| Re | range(0.1,0.1,100) |  |

##### Fully Coupled 1 (fc1)

General

| **Description** | **Value** |
| --- | --- |
| Linear solver | [Direct, fluid flow variables (spf)](#cs5015317) |

Method and termination

| **Description** | **Value** |
| --- | --- |
| Initial damping factor | 0.01 |
| Maximum number of iterations | 100 |

##### Direct, fluid flow variables (spf) (d1)

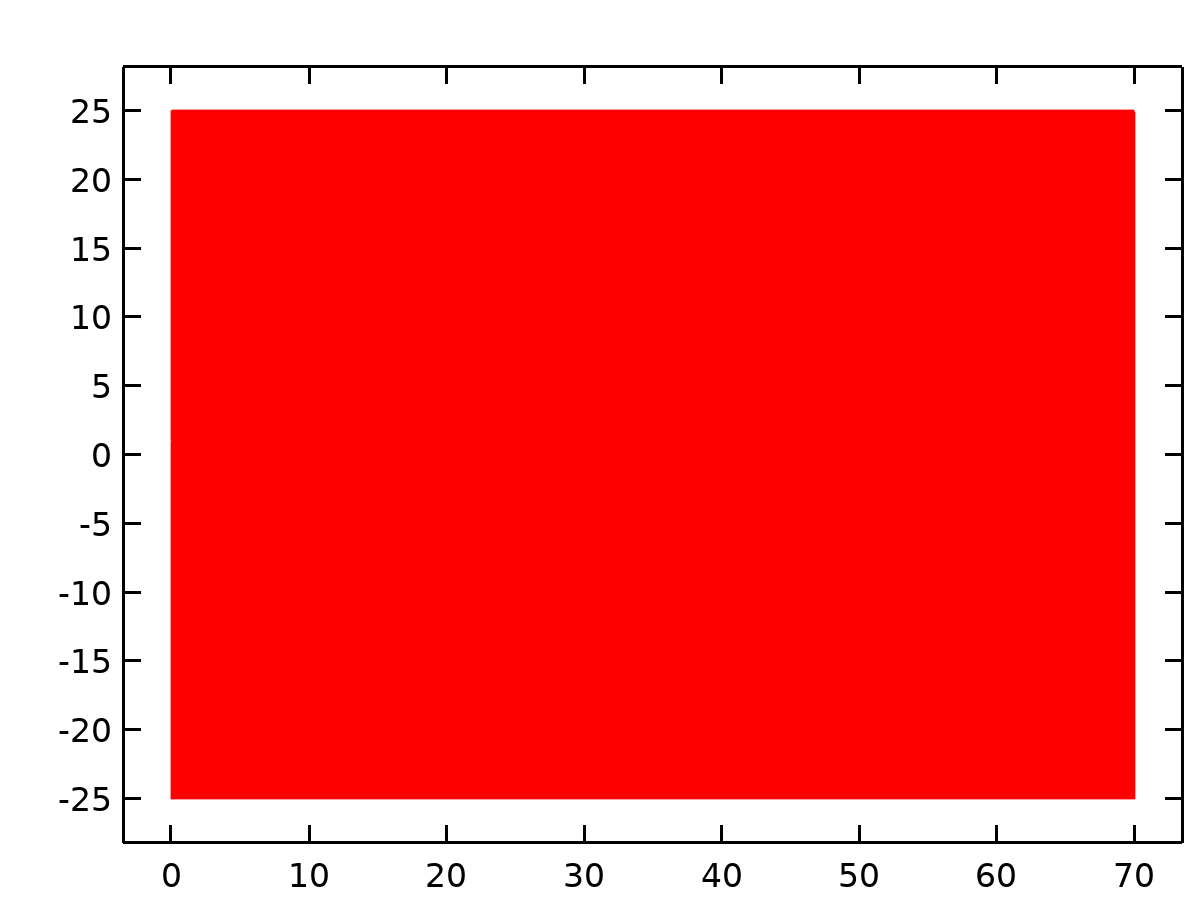
General

| **Description** | **Value** |
| --- | --- |
| Solver | PARDISO |
| Pivoting perturbation | 1.0E-13 |

1. Results
   1. Datasets
      1. Study 1/Solution 1

Solution

| **Description** | **Value** |
| --- | --- |
| Solution | [Solution 1](#cs7501066) |
| Component | Component 1 (comp1) |



Dataset: Study 1/Solution 1

* + 1. Revolution 2D

Data

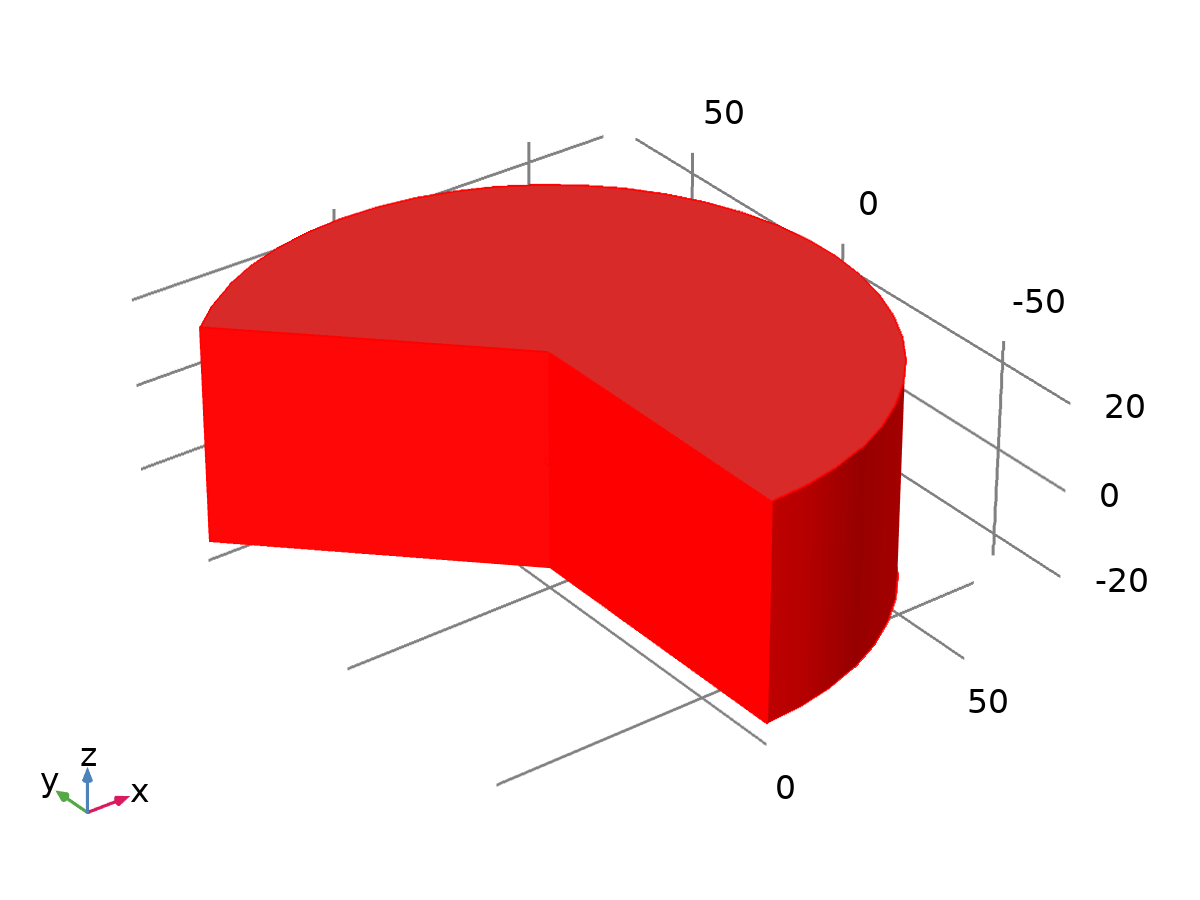
| **Description** | **Value** |
| --- | --- |
| Dataset | [Study 1/Solution 1](#cs6482698) |

Axis data

| **Description** | **Value** |
| --- | --- |
| Axis entry method | Two points |
| Points | {{0, 0}, {0, 1}} |

Revolution layers

| **Description** | **Value** |
| --- | --- |
| Start angle | -90 |
| Revolution angle | 225 |



Dataset: Revolution 2D

* 1. Derived Values
     1. Line Integration 1

Output

|  |  |
| --- | --- |
| Evaluated in | [Total Traction & Re Table](#cs7187939) |

Data

| **Description** | **Value** |
| --- | --- |
| Dataset | [Study 1/Solution 1](#cs6482698) |

Expressions

| **Expression** | **Unit** | **Description** |
| --- | --- | --- |
| spf.T\_stressphi |  | Total traction, exterior boundaries, phi component |
| spf.T\_stressr |  | Total traction, exterior boundaries, r component |
| spf.T\_stressz |  | Total traction, exterior boundaries, z component |
|  |  |  |

Integration settings

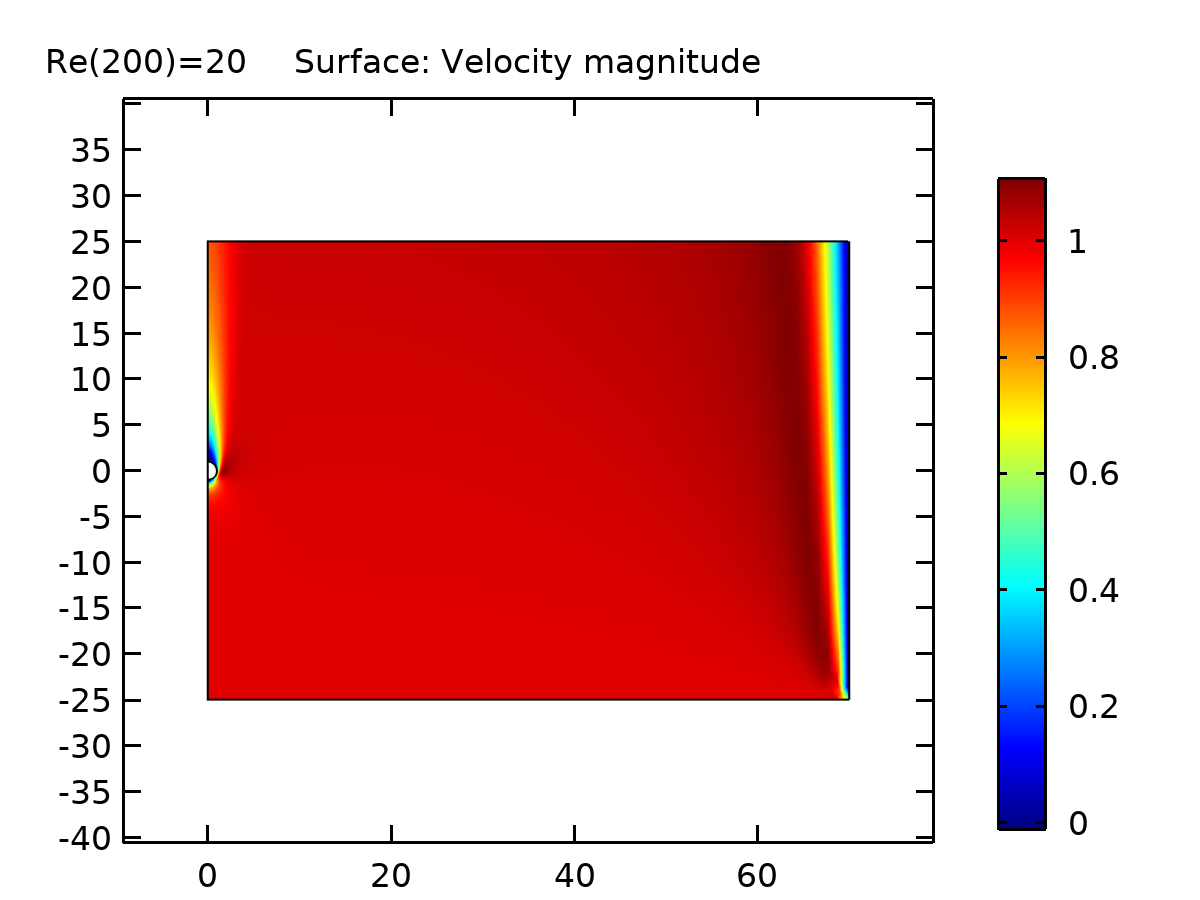
| **Description** | **Value** |
| --- | --- |
| Integration order | 4 |
| Compute surface integral | On |

* 1. Tables
     1. Total Traction & Re Table

Line Integration 1

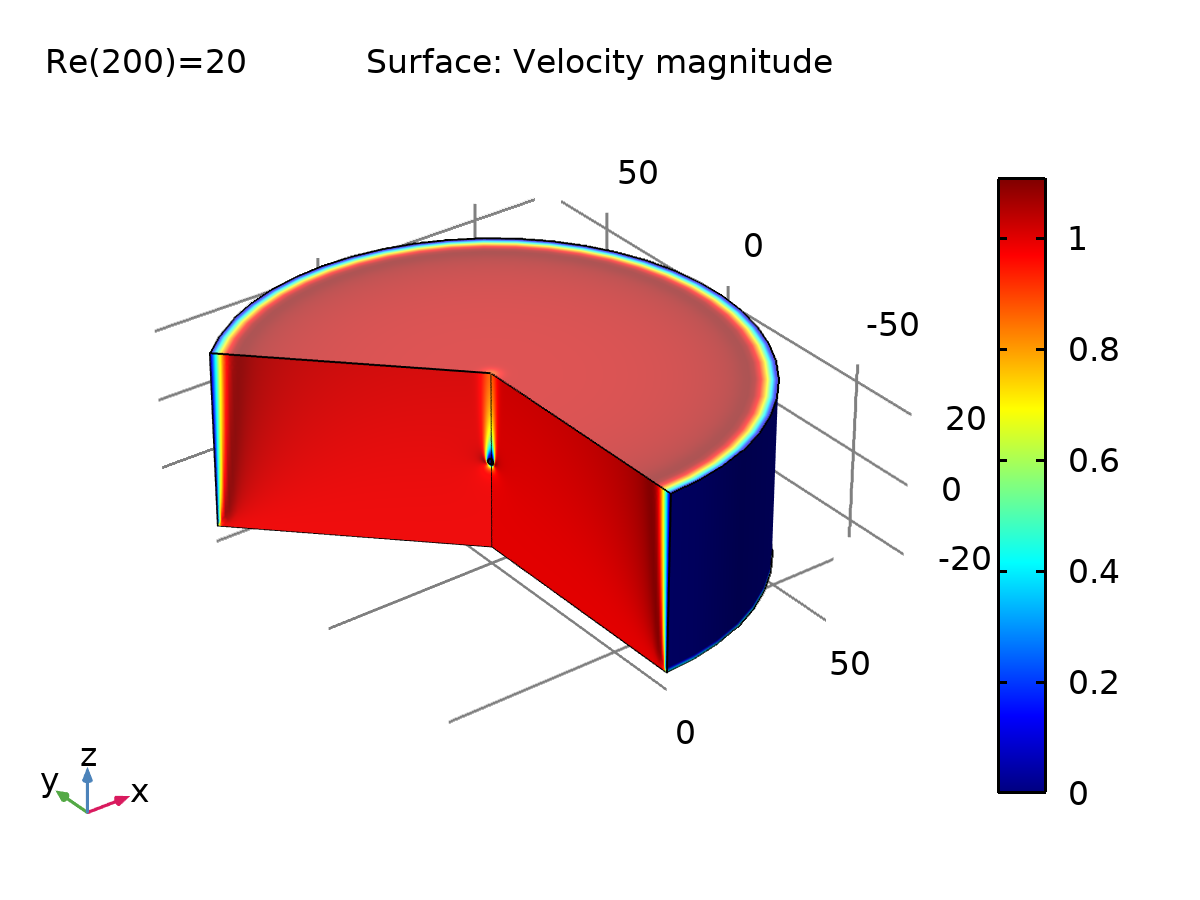
| **Re** | **Total traction, exterior boundaries, phi component** | **Total traction, exterior boundaries, r component** | **Total traction, exterior boundaries, z component** |
| --- | --- | --- | --- |
| 0.10000 | 0.0000 | -0.054954 | -21.338 |
| 0.20000 | 0.0000 | -0.25441 | -20.577 |
| 0.30000 | 0.0000 | -0.46773 | -20.523 |
| 0.40000 | 0.0000 | -0.68407 | -20.691 |
| 0.50000 | 0.0000 | -0.90035 | -20.935 |
| 0.60000 | 0.0000 | -1.1154 | -21.209 |
| 0.70000 | 0.0000 | -1.3288 | -21.493 |
| 0.80000 | 0.0000 | -1.5405 | -21.781 |
| 0.90000 | 0.0000 | -1.7505 | -22.070 |
| 1.0000 | 0.0000 | -1.9588 | -22.356 |
| 1.1000 | 0.0000 | -2.1657 | -22.639 |
| 1.2000 | 0.0000 | -2.3712 | -22.918 |
| 1.3000 | 0.0000 | -2.5754 | -23.194 |
| 1.4000 | 0.0000 | -2.7785 | -23.465 |
| 1.5000 | 0.0000 | -2.9805 | -23.732 |
| 1.6000 | 0.0000 | -3.1815 | -23.995 |
| 1.7000 | 0.0000 | -3.3816 | -24.254 |
| 1.8000 | 0.0000 | -3.5809 | -24.510 |
| 1.9000 | 0.0000 | -3.7794 | -24.761 |
| 2.0000 | 0.0000 | -3.9771 | -25.009 |
| 2.1000 | 0.0000 | -4.1742 | -25.254 |
| 2.2000 | 0.0000 | -4.3706 | -25.495 |
| 2.3000 | 0.0000 | -4.5664 | -25.732 |
| 2.4000 | 0.0000 | -4.7617 | -25.967 |
| 2.5000 | 0.0000 | -4.9565 | -26.199 |
| 2.6000 | 0.0000 | -5.1507 | -26.427 |
| 2.7000 | 0.0000 | -5.3446 | -26.653 |
| 2.8000 | 0.0000 | -5.5379 | -26.876 |
| 2.9000 | 0.0000 | -5.7309 | -27.097 |
| 3.0000 | 0.0000 | -5.9234 | -27.315 |
| 3.1000 | 0.0000 | -6.1156 | -27.530 |
| 3.2000 | 0.0000 | -6.3074 | -27.743 |
| 3.3000 | 0.0000 | -6.4989 | -27.954 |
| 3.4000 | 0.0000 | -6.6901 | -28.163 |
| 3.5000 | 0.0000 | -6.8810 | -28.369 |
| 3.6000 | 0.0000 | -7.0715 | -28.574 |
| 3.7000 | 0.0000 | -7.2618 | -28.776 |
| 3.8000 | 0.0000 | -7.4519 | -28.977 |
| 3.9000 | 0.0000 | -7.6416 | -29.175 |
| 4.0000 | 0.0000 | -7.8312 | -29.372 |
| 4.1000 | 0.0000 | -8.0205 | -29.567 |
| 4.2000 | 0.0000 | -8.2095 | -29.760 |
| 4.3000 | 0.0000 | -8.3984 | -29.952 |
| 4.4000 | 0.0000 | -8.5870 | -30.142 |
| 4.5000 | 0.0000 | -8.7754 | -30.330 |
| 4.6000 | 0.0000 | -8.9637 | -30.516 |
| 4.7000 | 0.0000 | -9.1517 | -30.702 |
| 4.8000 | 0.0000 | -9.3396 | -30.885 |
| 4.9000 | 0.0000 | -9.5273 | -31.068 |
| 5.0000 | 0.0000 | -9.7148 | -31.248 |
| 5.1000 | 0.0000 | -9.9022 | -31.428 |
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| 43.400 | 0.0000 | -75.784 | -71.074 |
| 43.500 | 0.0000 | -75.940 | -71.152 |
| 43.600 | 0.0000 | -76.097 | -71.230 |
| 43.700 | 0.0000 | -76.252 | -71.308 |
| 43.800 | 0.0000 | -76.408 | -71.386 |
| 43.900 | 0.0000 | -76.564 | -71.464 |
| 44.000 | 0.0000 | -76.719 | -71.541 |
| 44.100 | 0.0000 | -76.875 | -71.619 |
| 44.200 | 0.0000 | -77.030 | -71.697 |
| 44.300 | 0.0000 | -77.185 | -71.774 |
| 44.400 | 0.0000 | -77.340 | -71.852 |
| 44.500 | 0.0000 | -77.495 | -71.929 |
| 44.600 | 0.0000 | -77.650 | -72.007 |
| 44.700 | 0.0000 | -77.805 | -72.084 |
| 44.800 | 0.0000 | -77.959 | -72.162 |
| 44.900 | 0.0000 | -78.114 | -72.239 |
| 45.000 | 0.0000 | -78.268 | -72.317 |
| 45.100 | 0.0000 | -78.422 | -72.394 |
| 45.200 | 0.0000 | -78.577 | -72.471 |
| 45.300 | 0.0000 | -78.731 | -72.549 |
| 45.400 | 0.0000 | -78.885 | -72.626 |
| 45.500 | 0.0000 | -79.038 | -72.704 |
| 45.600 | 0.0000 | -79.192 | -72.781 |
| 45.700 | 0.0000 | -79.346 | -72.858 |
| 45.800 | 0.0000 | -79.500 | -72.935 |
| 45.900 | 0.0000 | -79.653 | -73.012 |
| 46.000 | 0.0000 | -79.807 | -73.089 |
| 46.100 | 0.0000 | -79.960 | -73.166 |
| 46.200 | 0.0000 | -80.112 | -73.243 |
| 46.300 | 0.0000 | -80.265 | -73.320 |
| 46.400 | 0.0000 | -80.417 | -73.397 |
| 46.500 | 0.0000 | -80.570 | -73.474 |
| 46.600 | 0.0000 | -80.723 | -73.551 |
| 46.700 | 0.0000 | -80.875 | -73.628 |
| 46.800 | 0.0000 | -81.028 | -73.704 |
| 46.900 | 0.0000 | -81.181 | -73.781 |
| 47.000 | 0.0000 | -81.333 | -73.858 |
| 47.100 | 0.0000 | -81.485 | -73.935 |
| 47.200 | 0.0000 | -81.637 | -74.011 |
| 47.300 | 0.0000 | -81.789 | -74.088 |
| 47.400 | 0.0000 | -81.941 | -74.164 |
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| 47.600 | 0.0000 | -82.245 | -74.317 |
| 47.700 | 0.0000 | -82.396 | -74.393 |
| 47.800 | 0.0000 | -82.548 | -74.469 |
| 47.900 | 0.0000 | -82.700 | -74.546 |
| 48.000 | 0.0000 | -82.851 | -74.622 |
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| 48.900 | 0.0000 | -84.208 | -75.306 |
| 49.000 | 0.0000 | -84.358 | -75.382 |
| 49.100 | 0.0000 | -84.507 | -75.458 |
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| 49.300 | 0.0000 | -84.807 | -75.609 |
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| 49.800 | 0.0000 | -85.556 | -75.987 |
| 49.900 | 0.0000 | -85.705 | -76.062 |
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| 81.600 | 0.0000 | -126.65 | -98.923 |
| 81.700 | 0.0000 | -126.76 | -98.993 |
| 81.800 | 0.0000 | -126.87 | -99.063 |
| 81.900 | 0.0000 | -126.98 | -99.133 |
| 82.000 | 0.0000 | -127.09 | -99.204 |
| 82.100 | 0.0000 | -127.20 | -99.274 |
| 82.200 | 0.0000 | -127.31 | -99.344 |
| 82.300 | 0.0000 | -127.43 | -99.415 |
| 82.400 | 0.0000 | -127.53 | -99.485 |
| 82.500 | 0.0000 | -127.64 | -99.555 |
| 82.600 | 0.0000 | -127.75 | -99.626 |
| 82.700 | 0.0000 | -127.86 | -99.696 |
| 82.800 | 0.0000 | -127.97 | -99.766 |
| 82.900 | 0.0000 | -128.08 | -99.836 |
| 83.000 | 0.0000 | -128.19 | -99.907 |
| 83.100 | 0.0000 | -128.30 | -99.977 |
| 83.200 | 0.0000 | -128.41 | -100.05 |
| 83.300 | 0.0000 | -128.52 | -100.12 |
| 83.400 | 0.0000 | -128.63 | -100.19 |
| 83.500 | 0.0000 | -128.74 | -100.26 |
| 83.600 | 0.0000 | -128.85 | -100.33 |
| 83.700 | 0.0000 | -128.95 | -100.40 |
| 83.800 | 0.0000 | -129.06 | -100.47 |
| 83.900 | 0.0000 | -129.17 | -100.54 |
| 84.000 | 0.0000 | -129.28 | -100.61 |
| 84.100 | 0.0000 | -129.39 | -100.68 |
| 84.200 | 0.0000 | -129.50 | -100.75 |
| 84.300 | 0.0000 | -129.60 | -100.82 |
| 84.400 | 0.0000 | -129.71 | -100.89 |
| 84.500 | 0.0000 | -129.82 | -100.96 |
| 84.600 | 0.0000 | -129.92 | -101.03 |
| 84.700 | 0.0000 | -130.04 | -101.10 |
| 84.800 | 0.0000 | -130.15 | -101.17 |
| 84.900 | 0.0000 | -130.26 | -101.24 |
| 85.000 | 0.0000 | -130.38 | -101.31 |
| 85.100 | 0.0000 | -130.49 | -101.38 |
| 85.200 | 0.0000 | -130.60 | -101.45 |
| 85.300 | 0.0000 | -130.70 | -101.52 |
| 85.400 | 0.0000 | -130.81 | -101.59 |
| 85.500 | 0.0000 | -130.92 | -101.66 |
| 85.600 | 0.0000 | -131.02 | -101.74 |
| 85.700 | 0.0000 | -131.13 | -101.81 |
| 85.800 | 0.0000 | -131.23 | -101.87 |
| 85.900 | 0.0000 | -131.34 | -101.94 |
| 86.000 | 0.0000 | -131.44 | -102.01 |
| 86.100 | 0.0000 | -131.54 | -102.08 |
| 86.200 | 0.0000 | -131.63 | -102.15 |
| 86.300 | 0.0000 | -131.73 | -102.22 |
| 86.400 | 0.0000 | -131.84 | -102.29 |
| 86.500 | 0.0000 | -131.94 | -102.36 |
| 86.600 | 0.0000 | -132.05 | -102.43 |
| 86.700 | 0.0000 | -132.15 | -102.50 |
| 86.800 | 0.0000 | -132.26 | -102.57 |
| 86.900 | 0.0000 | -132.36 | -102.64 |
| 87.000 | 0.0000 | -132.47 | -102.71 |
| 87.100 | 0.0000 | -132.57 | -102.78 |
| 87.200 | 0.0000 | -132.68 | -102.85 |
| 87.300 | 0.0000 | -132.78 | -102.92 |
| 87.400 | 0.0000 | -132.89 | -102.99 |
| 87.500 | 0.0000 | -132.99 | -103.06 |
| 87.600 | 0.0000 | -133.10 | -103.13 |
| 87.700 | 0.0000 | -133.22 | -103.20 |
| 87.800 | 0.0000 | -133.33 | -103.27 |
| 87.900 | 0.0000 | -133.43 | -103.34 |
| 88.000 | 0.0000 | -133.54 | -103.41 |
| 88.100 | 0.0000 | -133.64 | -103.48 |
| 88.200 | 0.0000 | -133.75 | -103.55 |
| 88.300 | 0.0000 | -133.85 | -103.62 |
| 88.400 | 0.0000 | -133.95 | -103.69 |
| 88.500 | 0.0000 | -134.06 | -103.75 |
| 88.600 | 0.0000 | -134.16 | -103.82 |
| 88.700 | 0.0000 | -134.26 | -103.89 |
| 88.800 | 0.0000 | -134.37 | -103.96 |
| 88.900 | 0.0000 | -134.47 | -104.03 |
| 89.000 | 0.0000 | -134.57 | -104.10 |
| 89.100 | 0.0000 | -134.68 | -104.17 |
| 89.200 | 0.0000 | -134.78 | -104.24 |
| 89.300 | 0.0000 | -134.88 | -104.31 |
| 89.400 | 0.0000 | -134.98 | -104.38 |
| 89.500 | 0.0000 | -135.09 | -104.45 |
| 89.600 | 0.0000 | -135.19 | -104.52 |
| 89.700 | 0.0000 | -135.29 | -104.59 |
| 89.800 | 0.0000 | -135.39 | -104.66 |
| 89.900 | 0.0000 | -135.50 | -104.73 |
| 90.000 | 0.0000 | -135.60 | -104.80 |
| 90.100 | 0.0000 | -135.70 | -104.87 |
| 90.200 | 0.0000 | -135.80 | -104.94 |
| 90.300 | 0.0000 | -135.91 | -105.01 |
| 90.400 | 0.0000 | -136.01 | -105.08 |
| 90.500 | 0.0000 | -136.11 | -105.15 |
| 90.600 | 0.0000 | -136.21 | -105.22 |
| 90.700 | 0.0000 | -136.31 | -105.29 |
| 90.800 | 0.0000 | -136.41 | -105.36 |
| 90.900 | 0.0000 | -136.51 | -105.42 |
| 91.000 | 0.0000 | -136.61 | -105.50 |
| 91.100 | 0.0000 | -136.71 | -105.57 |
| 91.200 | 0.0000 | -136.82 | -105.63 |
| 91.300 | 0.0000 | -136.92 | -105.70 |
| 91.400 | 0.0000 | -137.02 | -105.77 |
| 91.500 | 0.0000 | -137.12 | -105.84 |
| 91.600 | 0.0000 | -137.22 | -105.91 |
| 91.700 | 0.0000 | -137.32 | -105.98 |
| 91.800 | 0.0000 | -137.42 | -106.05 |
| 91.900 | 0.0000 | -137.52 | -106.12 |
| 92.000 | 0.0000 | -137.62 | -106.19 |
| 92.100 | 0.0000 | -137.72 | -106.26 |
| 92.200 | 0.0000 | -137.82 | -106.33 |
| 92.300 | 0.0000 | -137.92 | -106.40 |
| 92.400 | 0.0000 | -138.02 | -106.47 |
| 92.500 | 0.0000 | -138.12 | -106.54 |
| 92.600 | 0.0000 | -138.22 | -106.61 |
| 92.700 | 0.0000 | -138.32 | -106.67 |
| 92.800 | 0.0000 | -138.42 | -106.74 |
| 92.900 | 0.0000 | -138.51 | -106.81 |
| 93.000 | 0.0000 | -138.61 | -106.88 |
| 93.100 | 0.0000 | -138.71 | -106.95 |
| 93.200 | 0.0000 | -138.81 | -107.02 |
| 93.300 | 0.0000 | -138.91 | -107.09 |
| 93.400 | 0.0000 | -139.01 | -107.16 |
| 93.500 | 0.0000 | -139.11 | -107.23 |
| 93.600 | 0.0000 | -139.21 | -107.30 |
| 93.700 | 0.0000 | -139.30 | -107.36 |
| 93.800 | 0.0000 | -139.40 | -107.43 |
| 93.900 | 0.0000 | -139.50 | -107.50 |
| 94.000 | 0.0000 | -139.60 | -107.57 |
| 94.100 | 0.0000 | -139.70 | -107.64 |
| 94.200 | 0.0000 | -139.80 | -107.71 |
| 94.300 | 0.0000 | -139.89 | -107.78 |
| 94.400 | 0.0000 | -139.99 | -107.85 |
| 94.500 | 0.0000 | -140.09 | -107.92 |
| 94.600 | 0.0000 | -140.19 | -107.99 |
| 94.700 | 0.0000 | -140.28 | -108.05 |
| 94.800 | 0.0000 | -140.38 | -108.12 |
| 94.900 | 0.0000 | -140.48 | -108.19 |
| 95.000 | 0.0000 | -140.57 | -108.26 |
| 95.100 | 0.0000 | -140.67 | -108.33 |
| 95.200 | 0.0000 | -140.77 | -108.40 |
| 95.300 | 0.0000 | -140.86 | -108.47 |
| 95.400 | 0.0000 | -140.96 | -108.54 |
| 95.500 | 0.0000 | -141.06 | -108.61 |
| 95.600 | 0.0000 | -141.15 | -108.67 |
| 95.700 | 0.0000 | -141.25 | -108.74 |
| 95.800 | 0.0000 | -141.35 | -108.81 |
| 95.900 | 0.0000 | -141.44 | -108.88 |
| 96.000 | 0.0000 | -141.54 | -108.95 |
| 96.100 | 0.0000 | -141.63 | -109.02 |
| 96.200 | 0.0000 | -141.73 | -109.09 |
| 96.300 | 0.0000 | -141.82 | -109.16 |
| 96.400 | 0.0000 | -141.92 | -109.22 |
| 96.500 | 0.0000 | -142.01 | -109.29 |
| 96.600 | 0.0000 | -142.11 | -109.36 |
| 96.700 | 0.0000 | -142.20 | -109.43 |
| 96.800 | 0.0000 | -142.30 | -109.50 |
| 96.900 | 0.0000 | -142.39 | -109.57 |
| 97.000 | 0.0000 | -142.49 | -109.64 |
| 97.100 | 0.0000 | -142.58 | -109.71 |
| 97.200 | 0.0000 | -142.68 | -109.77 |
| 97.300 | 0.0000 | -142.77 | -109.84 |
| 97.400 | 0.0000 | -142.87 | -109.91 |
| 97.500 | 0.0000 | -142.96 | -109.98 |
| 97.600 | 0.0000 | -143.05 | -110.05 |
| 97.700 | 0.0000 | -143.15 | -110.12 |
| 97.800 | 0.0000 | -143.24 | -110.19 |
| 97.900 | 0.0000 | -143.34 | -110.26 |
| 98.000 | 0.0000 | -143.43 | -110.32 |
| 98.100 | 0.0000 | -143.52 | -110.39 |
| 98.200 | 0.0000 | -143.62 | -110.46 |
| 98.300 | 0.0000 | -143.71 | -110.53 |
| 98.400 | 0.0000 | -143.80 | -110.60 |
| 98.500 | 0.0000 | -143.90 | -110.67 |
| 98.600 | 0.0000 | -143.99 | -110.74 |
| 98.700 | 0.0000 | -144.08 | -110.81 |
| 98.800 | 0.0000 | -144.18 | -110.87 |
| 98.900 | 0.0000 | -144.27 | -110.94 |
| 99.000 | 0.0000 | -144.36 | -111.01 |
| 99.100 | 0.0000 | -144.45 | -111.08 |
| 99.200 | 0.0000 | -144.55 | -111.15 |
| 99.300 | 0.0000 | -144.64 | -111.22 |
| 99.400 | 0.0000 | -144.73 | -111.29 |
| 99.500 | 0.0000 | -144.82 | -111.36 |
| 99.600 | 0.0000 | -144.92 | -111.42 |
| 99.700 | 0.0000 | -145.01 | -111.49 |
| 99.800 | 0.0000 | -145.10 | -111.56 |
| 99.900 | 0.0000 | -145.19 | -111.63 |
| 100.00 | 0.0000 | -145.28 | -111.70 |

* 1. Plot Groups
     1. Velocity (spf)



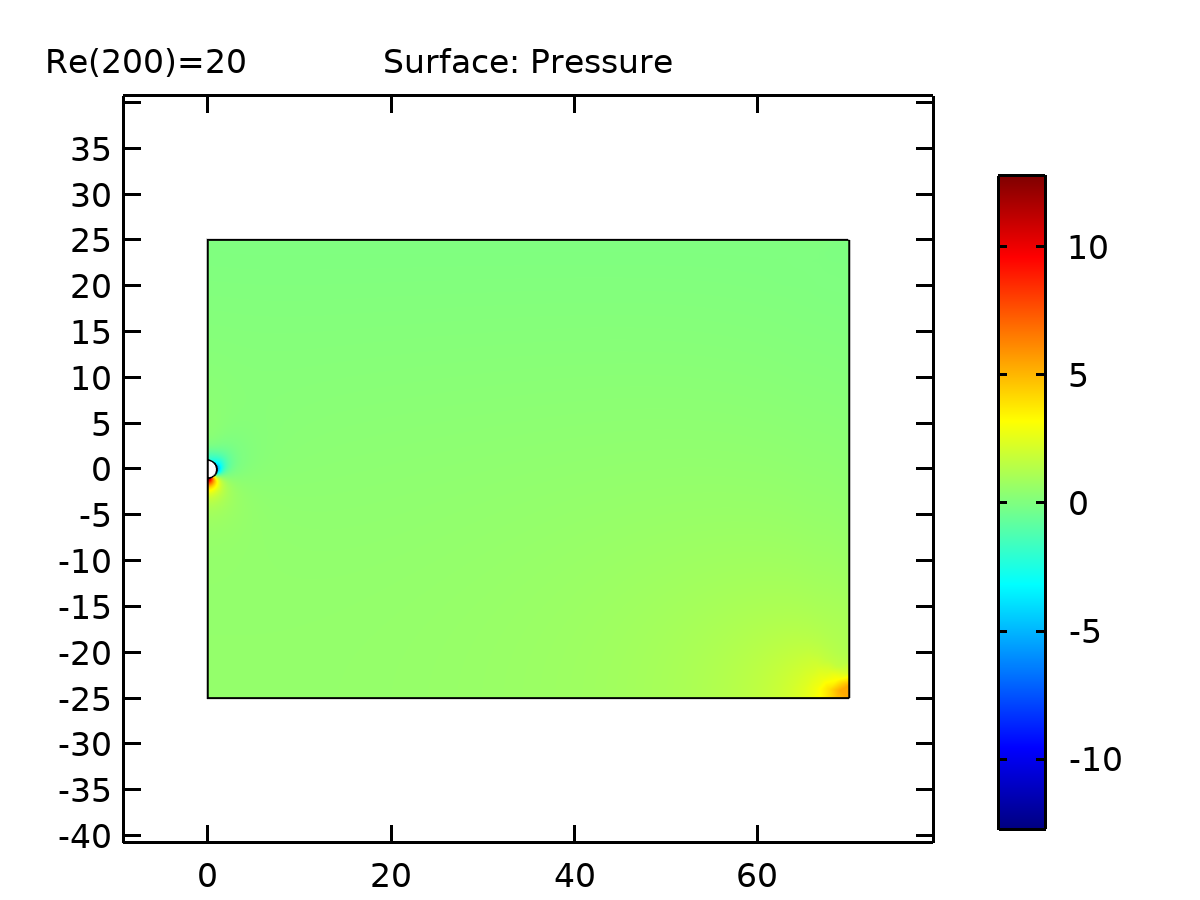
Surface: Velocity magnitude

* + 1. Velocity, 3D (spf)



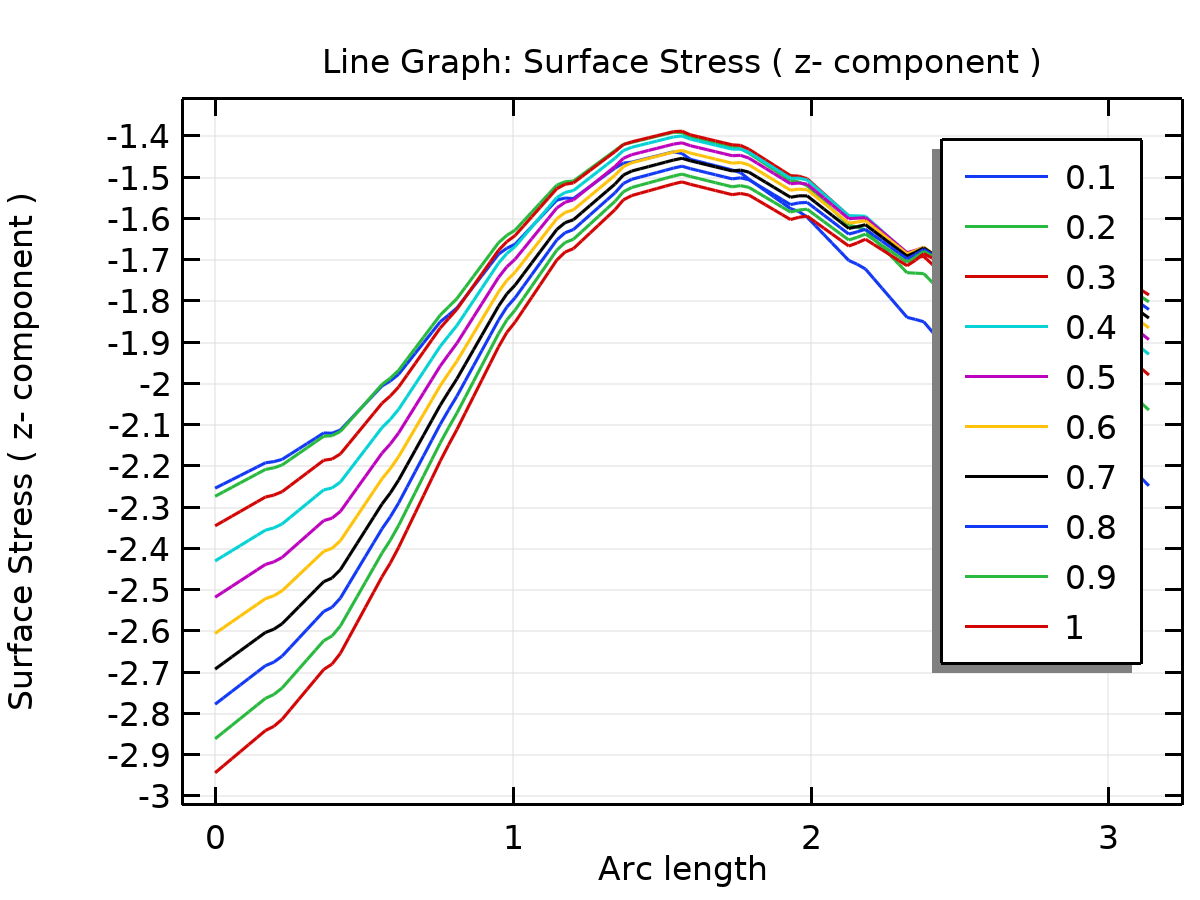
Surface: Velocity magnitude

* + 1. Pressure (spf)



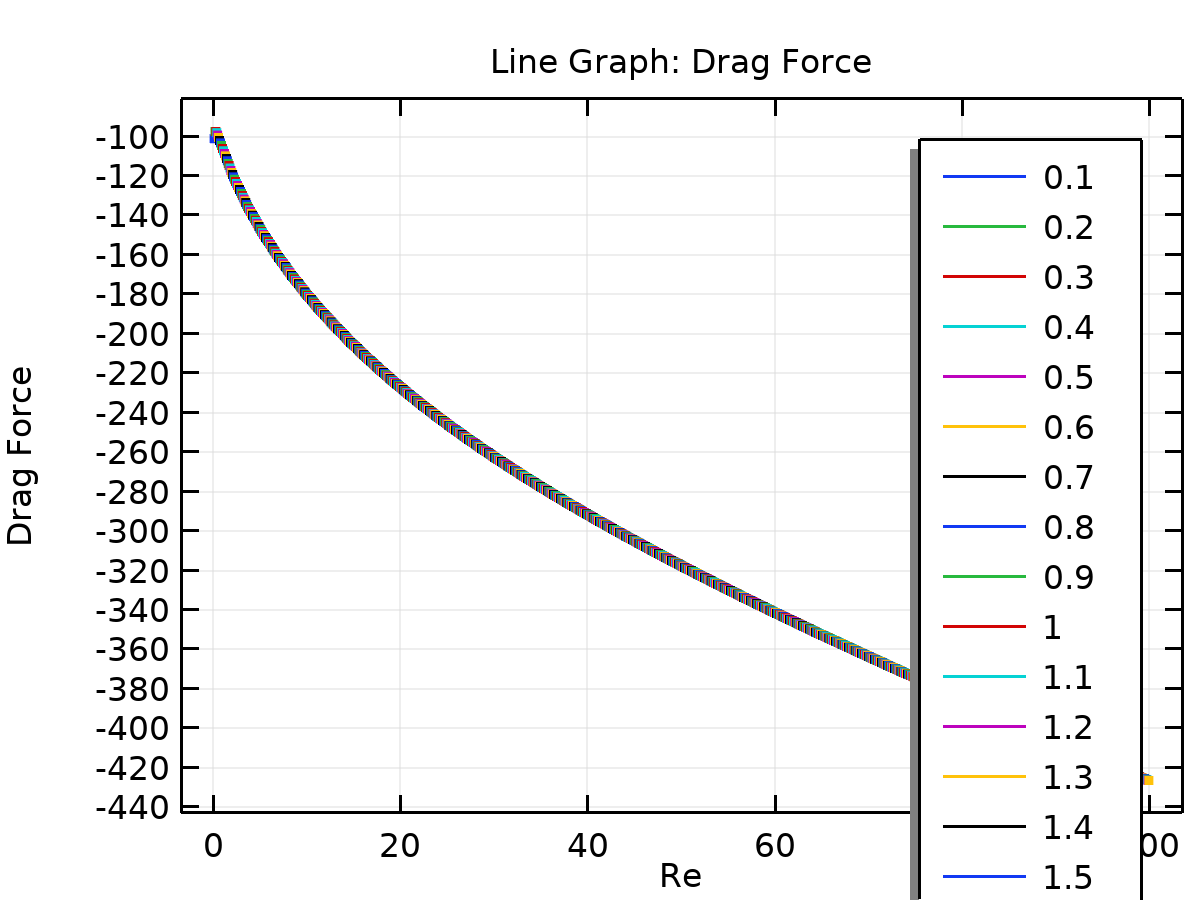
Surface: Pressure

* + 1. Surface Stress vs Arc Length



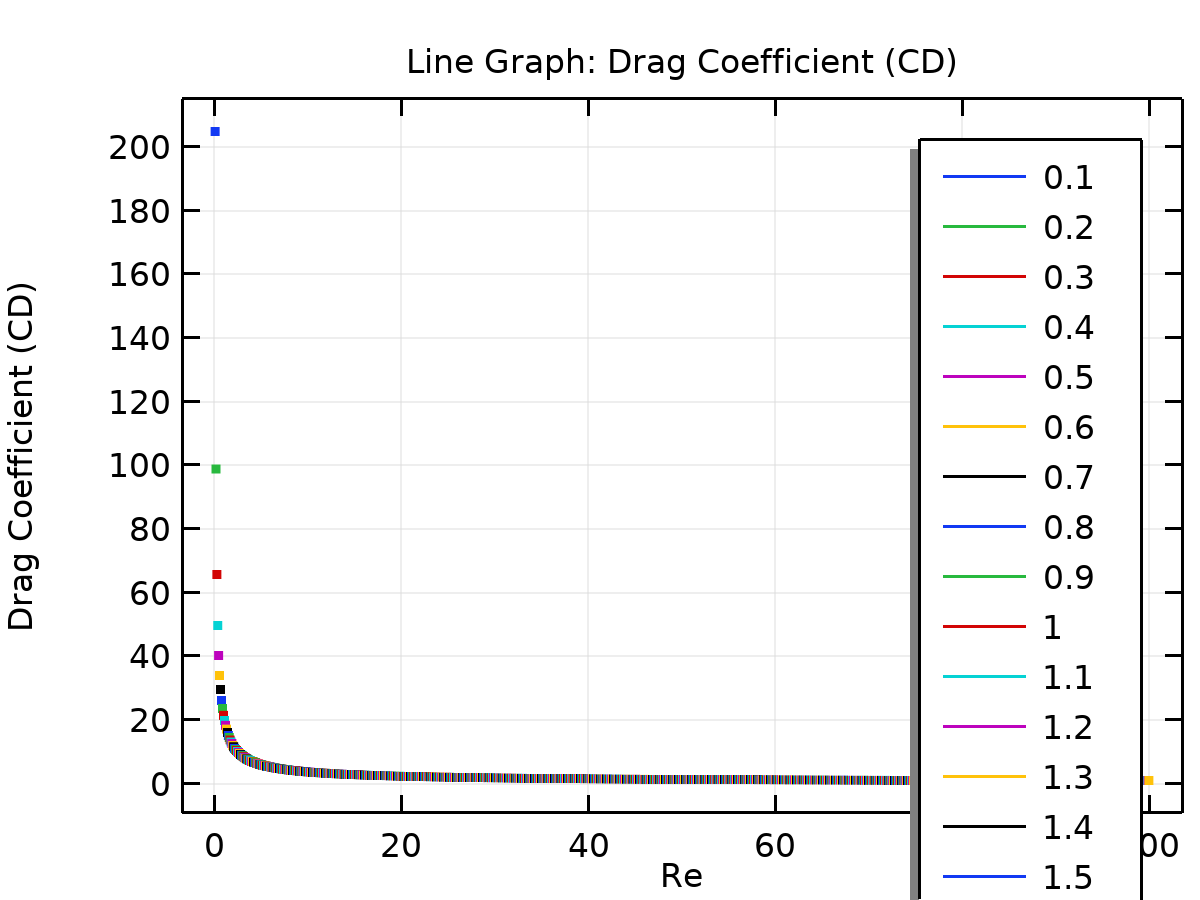
Line Graph: Surface Stress ( z- component )

* + 1. Drag Force vs Re



Line Graph: Drag Force

* + 1. Drag Coefficient vs Re



Line Graph: Drag Coefficient (CD)