FEAToolbox

Select Space Dimensions — 2D
Space Dimension Names — x y
Select Physics — Navier-Stokes Equations

Navier-Stokes Equations

$$\rho(u' + (u \cdot \nabla u)) = -\nabla p + \nabla \cdot (\mu(\nabla u + \nabla u^T)) + F, \nabla \cdot u = 0$$

Dependent Variable Names - $u \vee p$

Geometry details (Artery)
type : rectangle
tag : R1
x_{min} : 0
x_{max} : 2·2
y_{min} : 0
y_{max} : 0·41

* For Atherosclerosis add an ellipse onto the artery.

· ellipse geometry
   centre — 0.2274 0·1
   x_{radius} — 0·10423
   y_{radius} — 0·1

Grid Size
grid size = 0.02

Geometry details (Veins)
x_{min} : 0
x_{max} : 2·2
y_{min} : 0
y_{max} : 0·82

Equation settings
(ρ) density : 1
(μ) viscosity : 0·001

Boundary settings
boundary 2, Navier stokes equation (Outflow/pressure) $p = p_0$ ($p_0 = 0$)
boundary 4, Navier-stokes equation (Inlet/velocity) $u = v_0$

$$u_0 = 4 \cdot 0.3 \cdot (y \cdot (0.41 - y))/0.41^2$$
$$v_0 = 0$$

FEM Discretization: second order conforming stokes element