

Numerical experiment 8

Material parameters:

- Os: Young's modulus $E = 1,71 \times 10^{10}[\text{Pa}]$ and Poisson's ratio $\nu = 0,25$.
(1) Ti6Al4V: Young's modulus $E = 1,15 \times 10^{11}[\text{Pa}]$ and Poisson's ratio $\nu = 0,3$.
(2) Chirulen: Young's modulus $E = 3,4 \times 10^8[\text{Pa}]$ and Poisson's ratio $\nu = 0,4$.
(3) ZrO₂: Young's modulus $E = 4 \times 10^{11}[\text{Pa}]$ and Poisson's ratio $\nu = 0,22$.

Boundary conditions:

- Prescribed zero displacement on 1-2, 3-4
Pressure $0,215 \times 10^7[\text{Pa}]$ on 5-6.
Unilateral contact boundary: 7-8, 9-10 and 11-12.

Discretization statistics:

Model I (angle 3° between axis of femur and vertical axis)

13 subdomains, 3737 nodes, 7132 elements,
31+31+15 unilateral contact conditions, 344 interface elements.

Model II (angle 5° between axis of femur and vertical axis)

13 subdomains, 3780 nodes, 7208 elements,
31+31+15 unilateral contact conditions, 350 interface elements.

Model III (angle 7° between axis of femur and vertical axis)

13 subdomains, 3763 nodes, 7180 elements,
31+31+15 unilateral contact conditions, 346 interface elements.

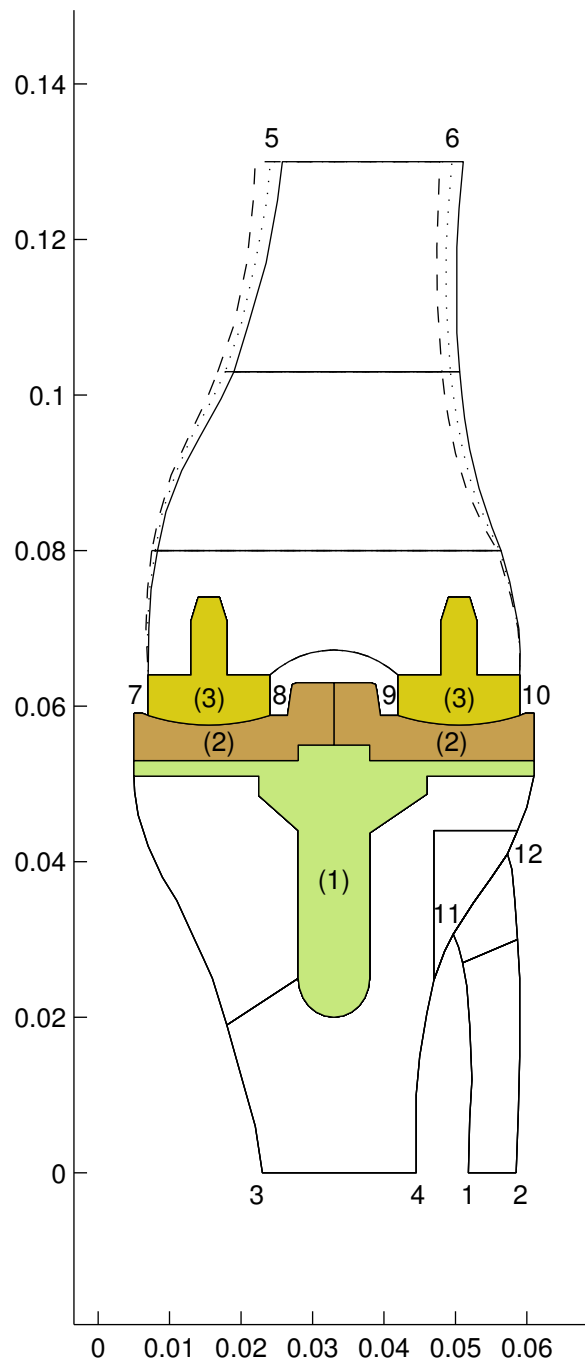


Figure 77: Geometry (Model I, II, III)

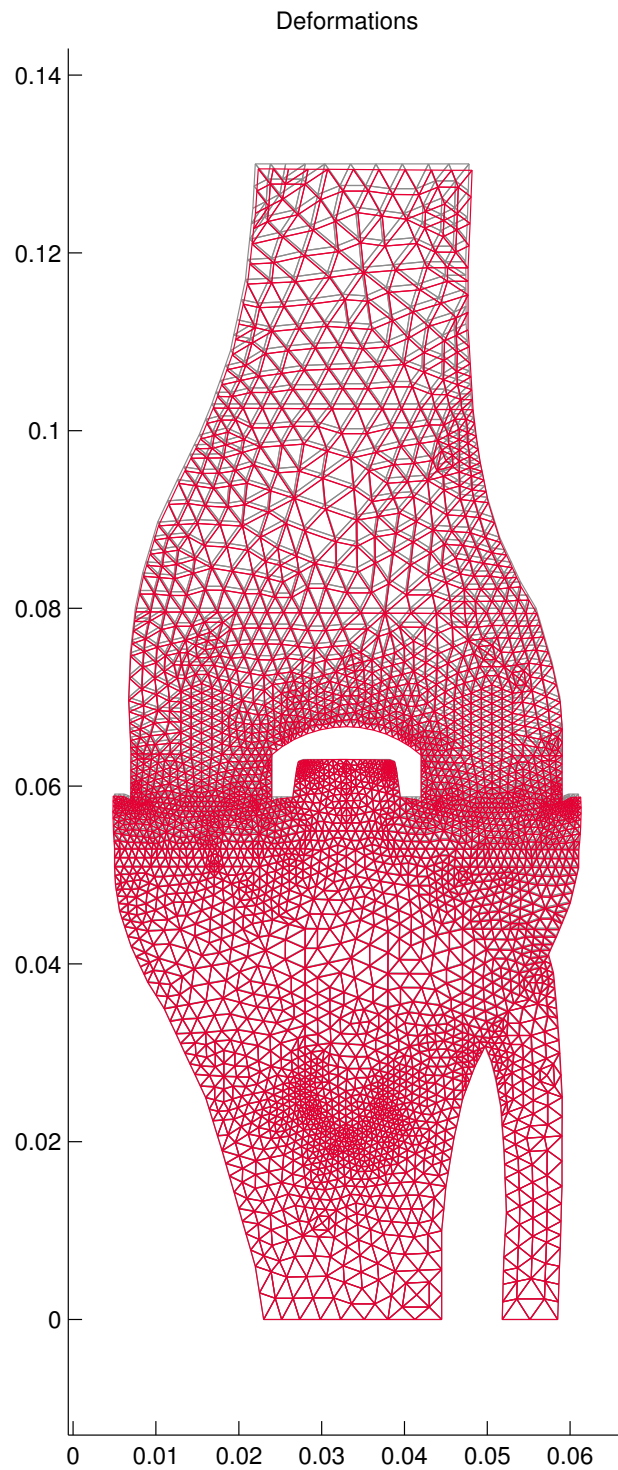


Figure 78: Model I - Deformations (enlarge factor=20)

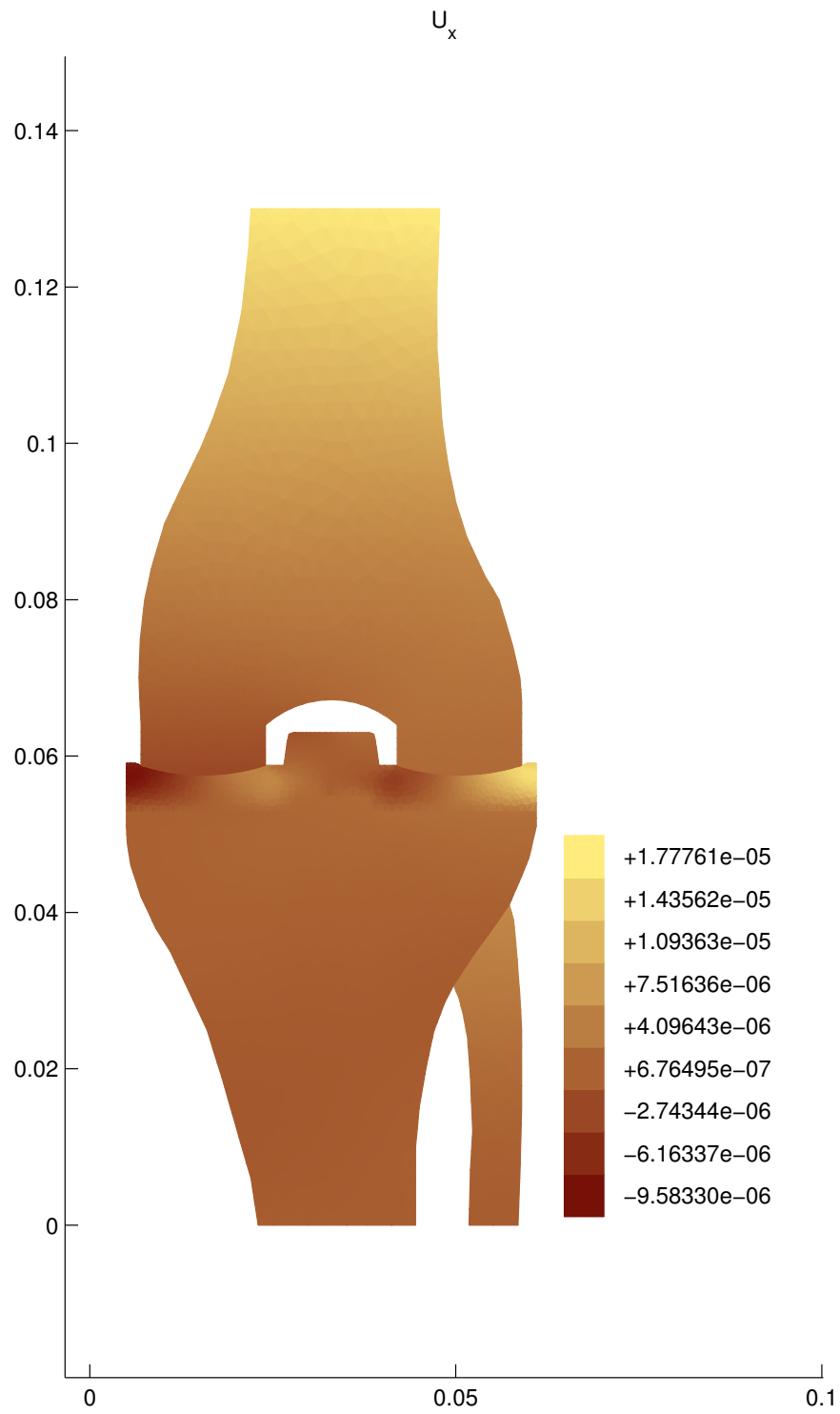


Figure 79: Model I - Horizontal component of displacement

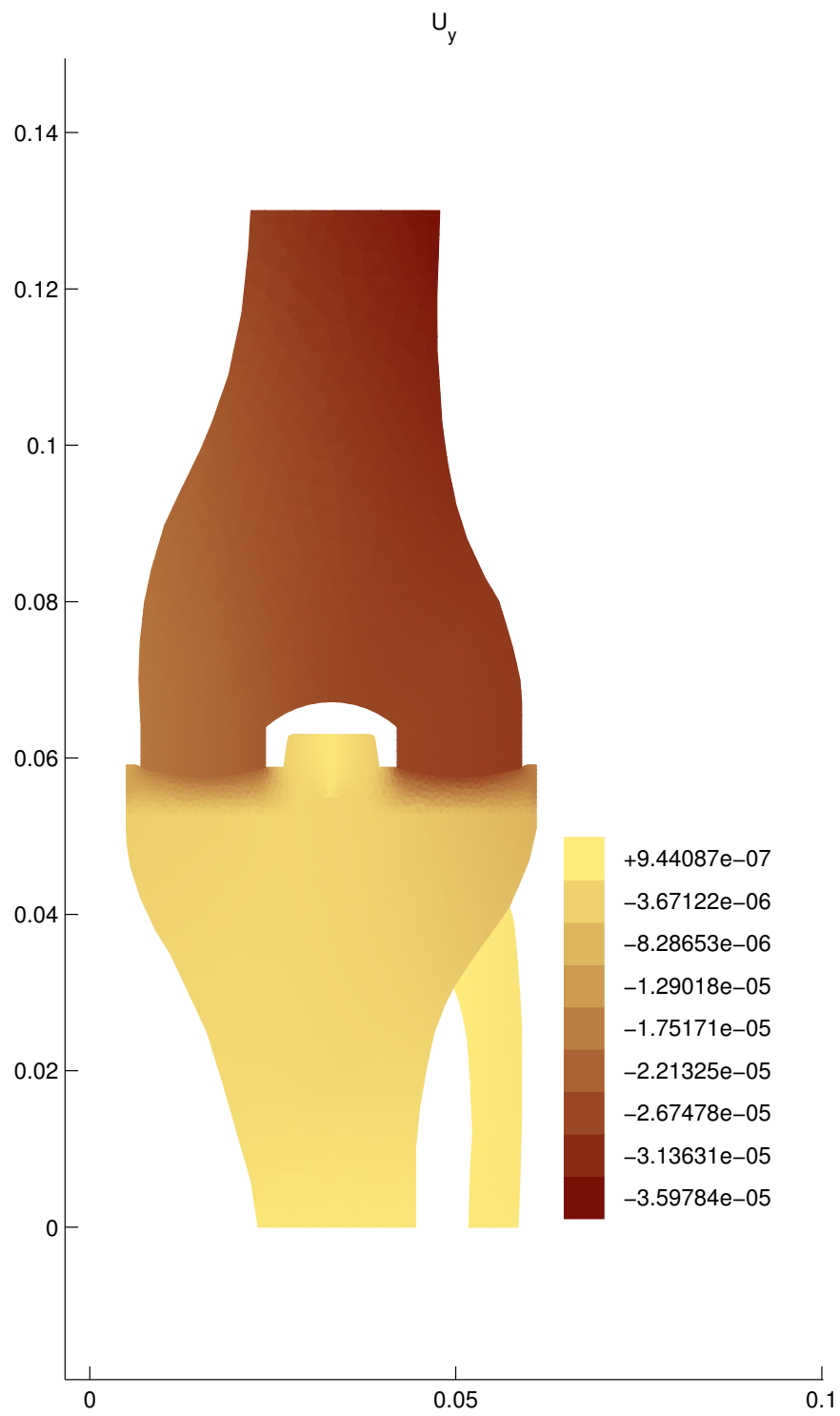


Figure 80: Model I - Vertical component of displacement

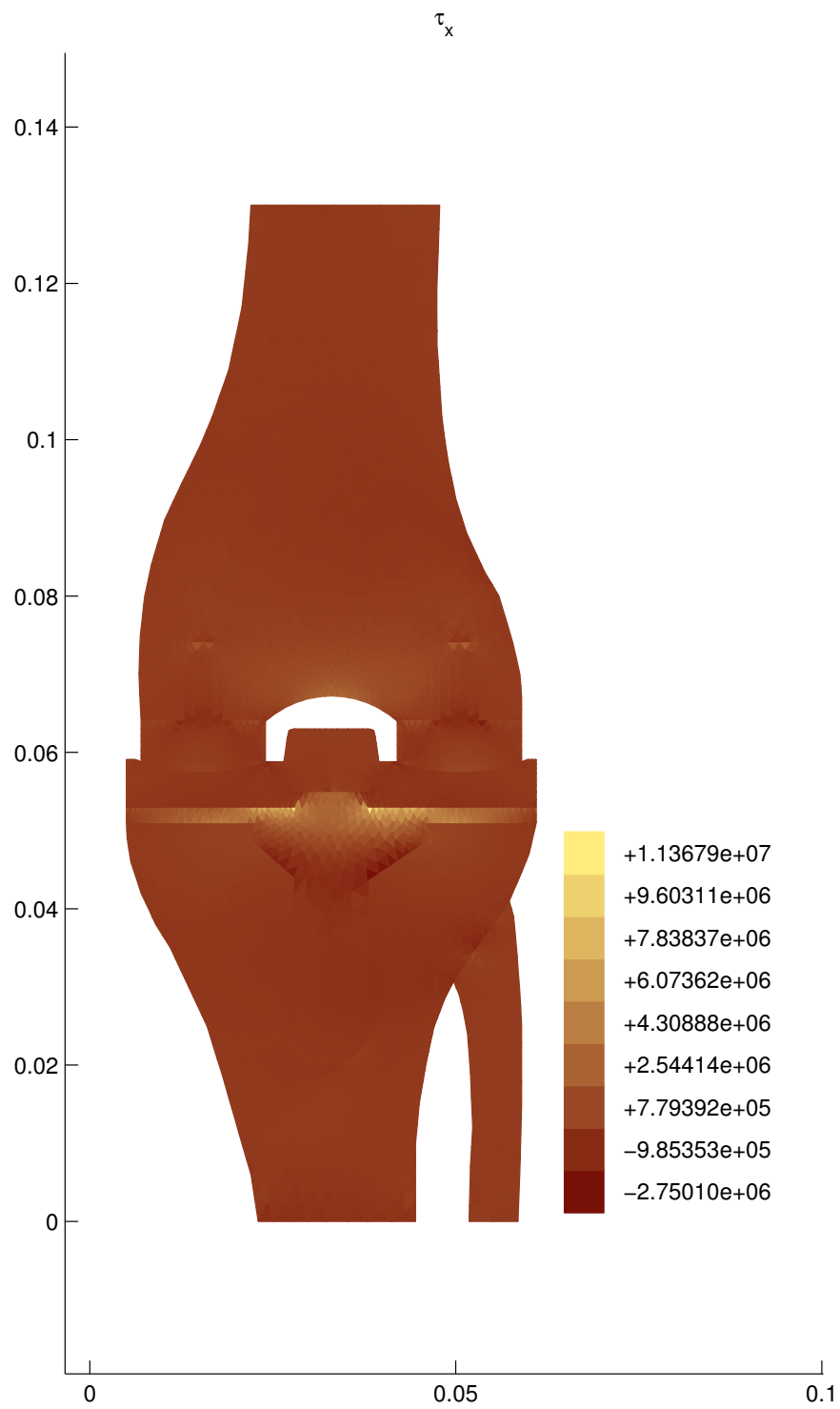


Figure 81: Model I - Stresses τ_x

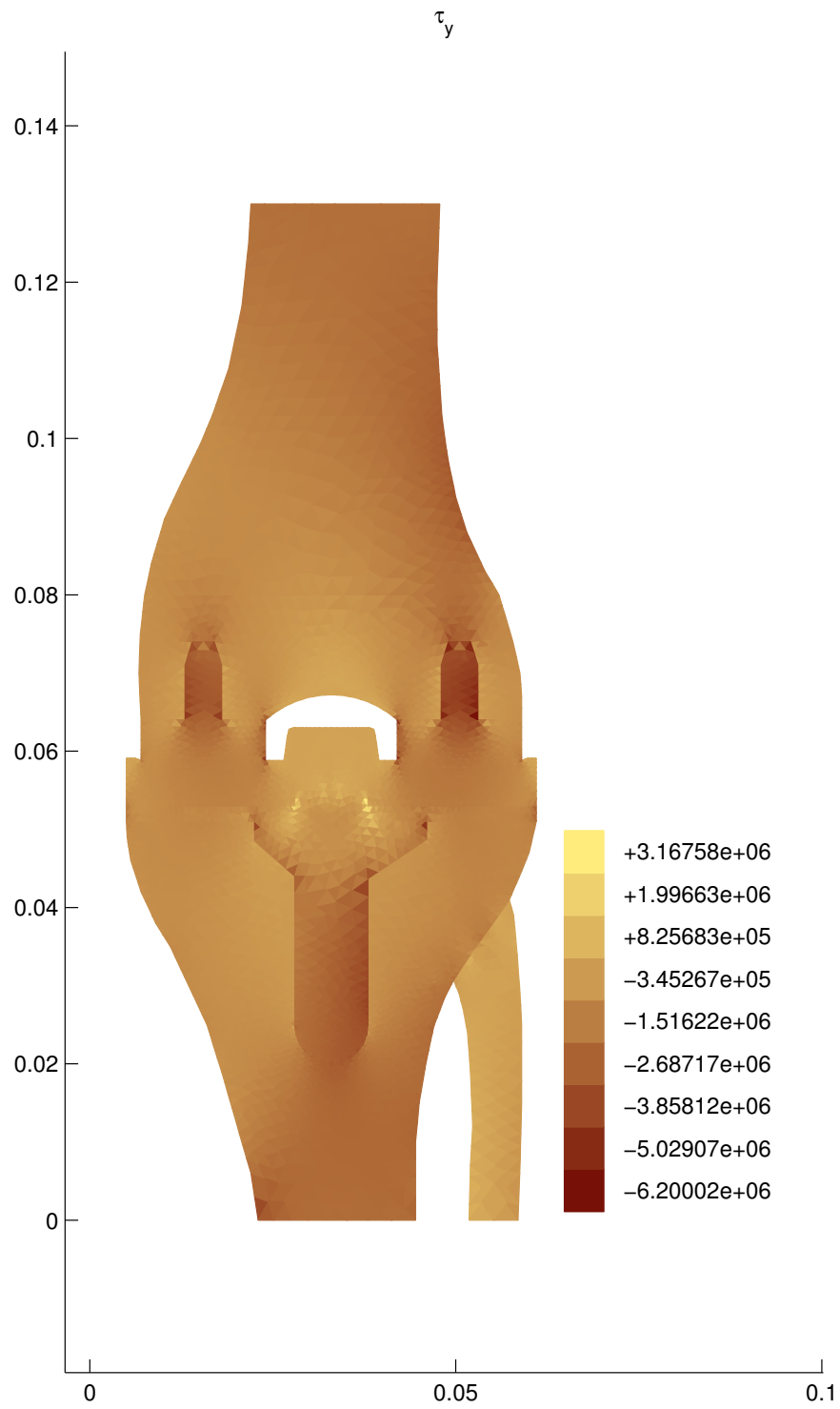


Figure 82: Model I - Stresses τ_y

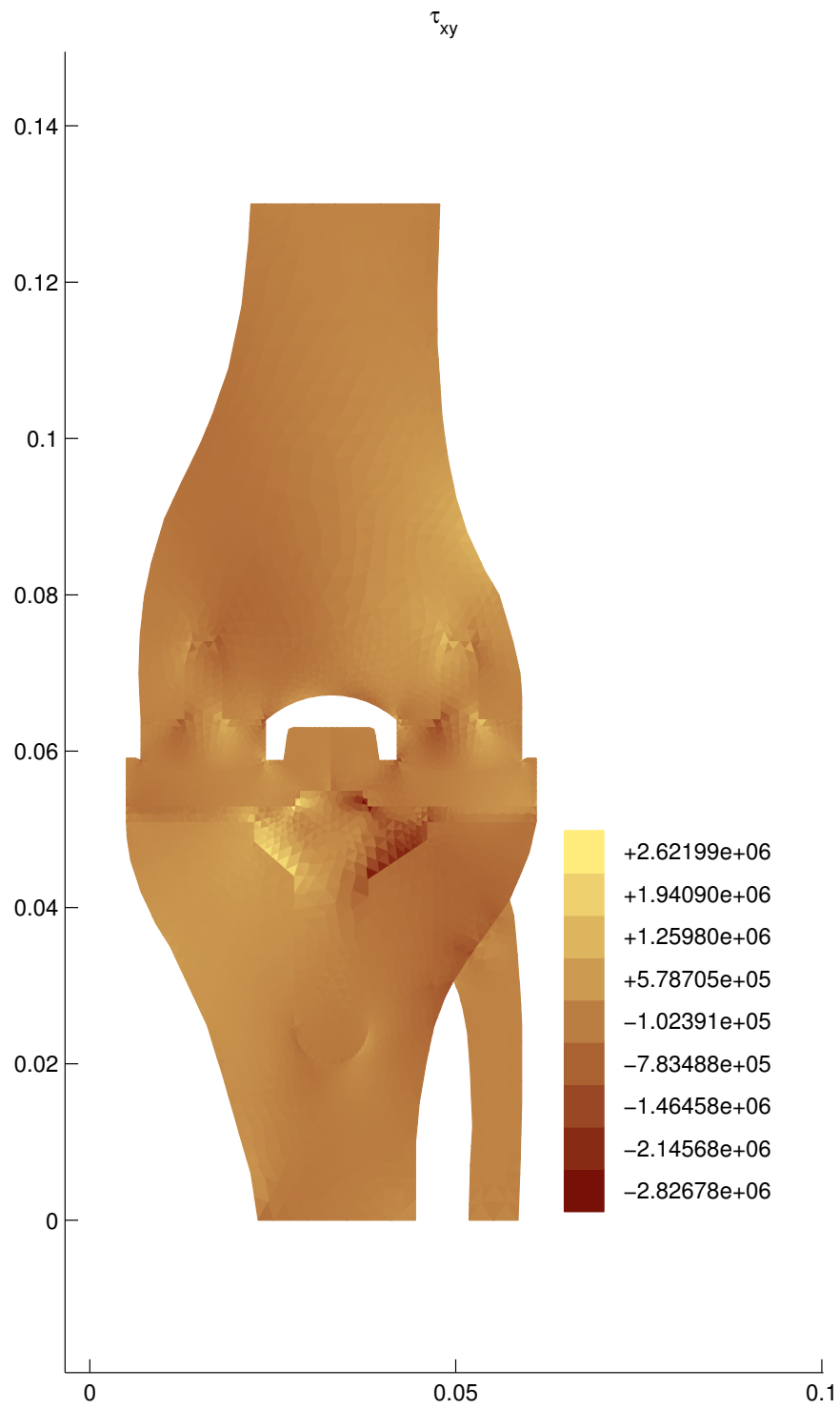


Figure 83: Model I - Stresses τ_{xy}

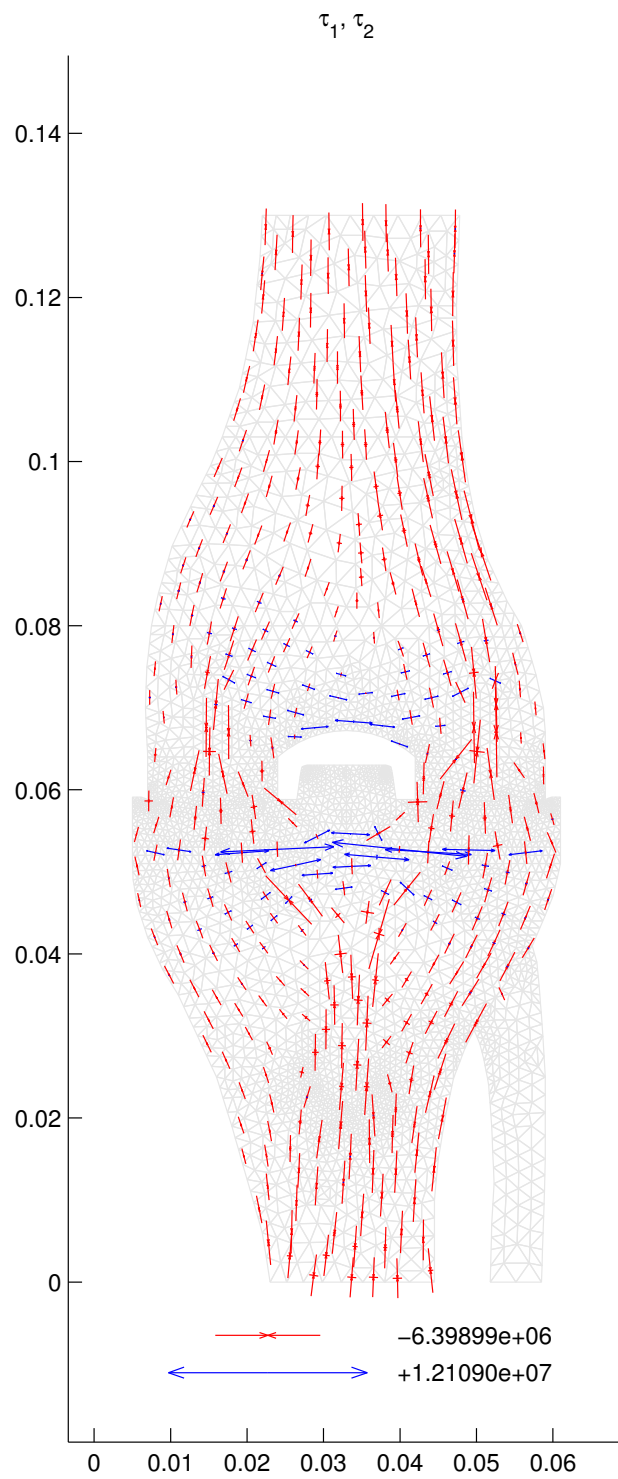


Figure 84: Model I - Principal stresses

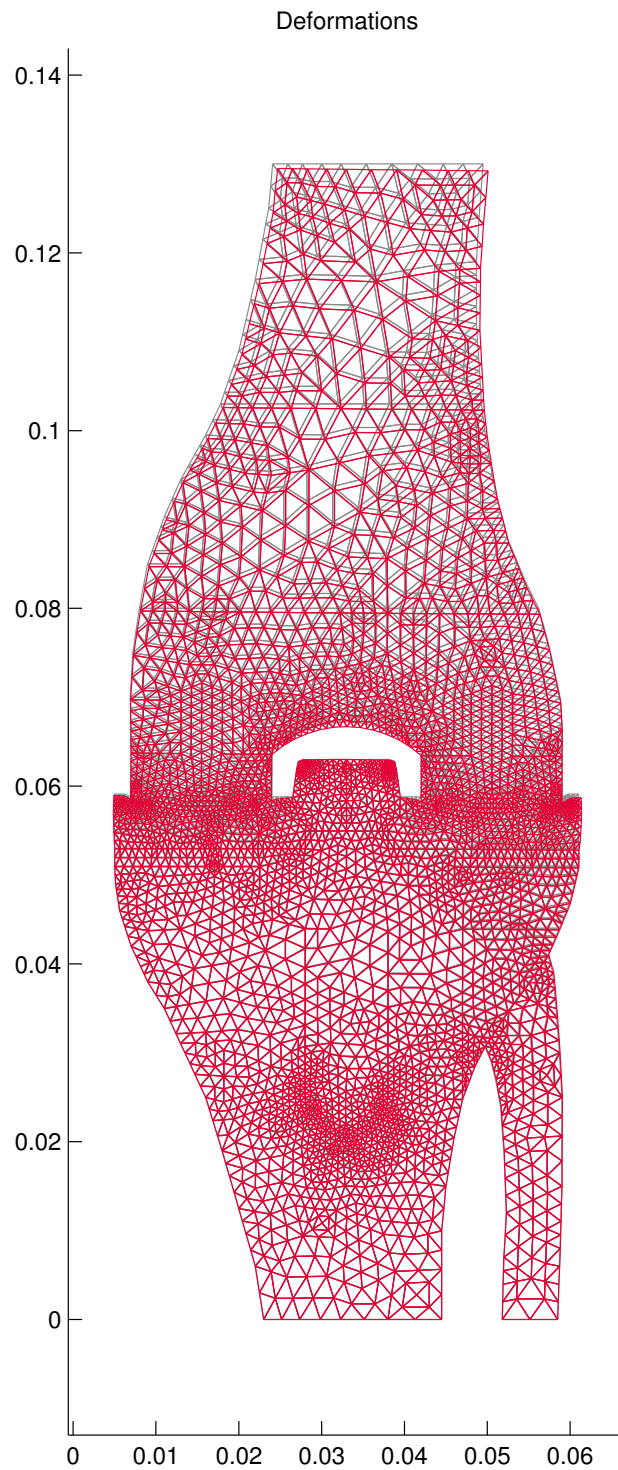


Figure 85: Model II - Deformations (enlarge factor=20)

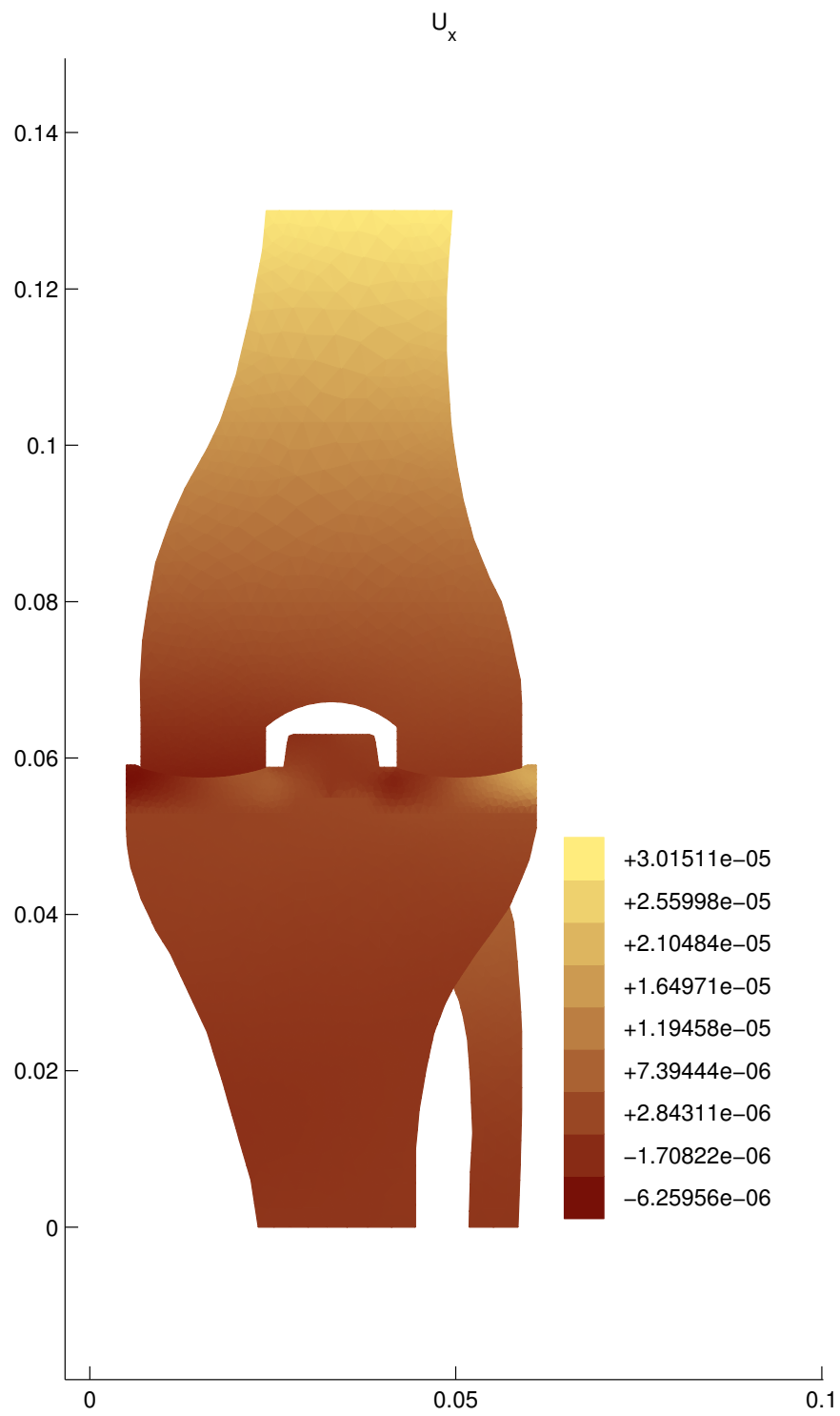


Figure 86: Model II - Horizontal component of displacement

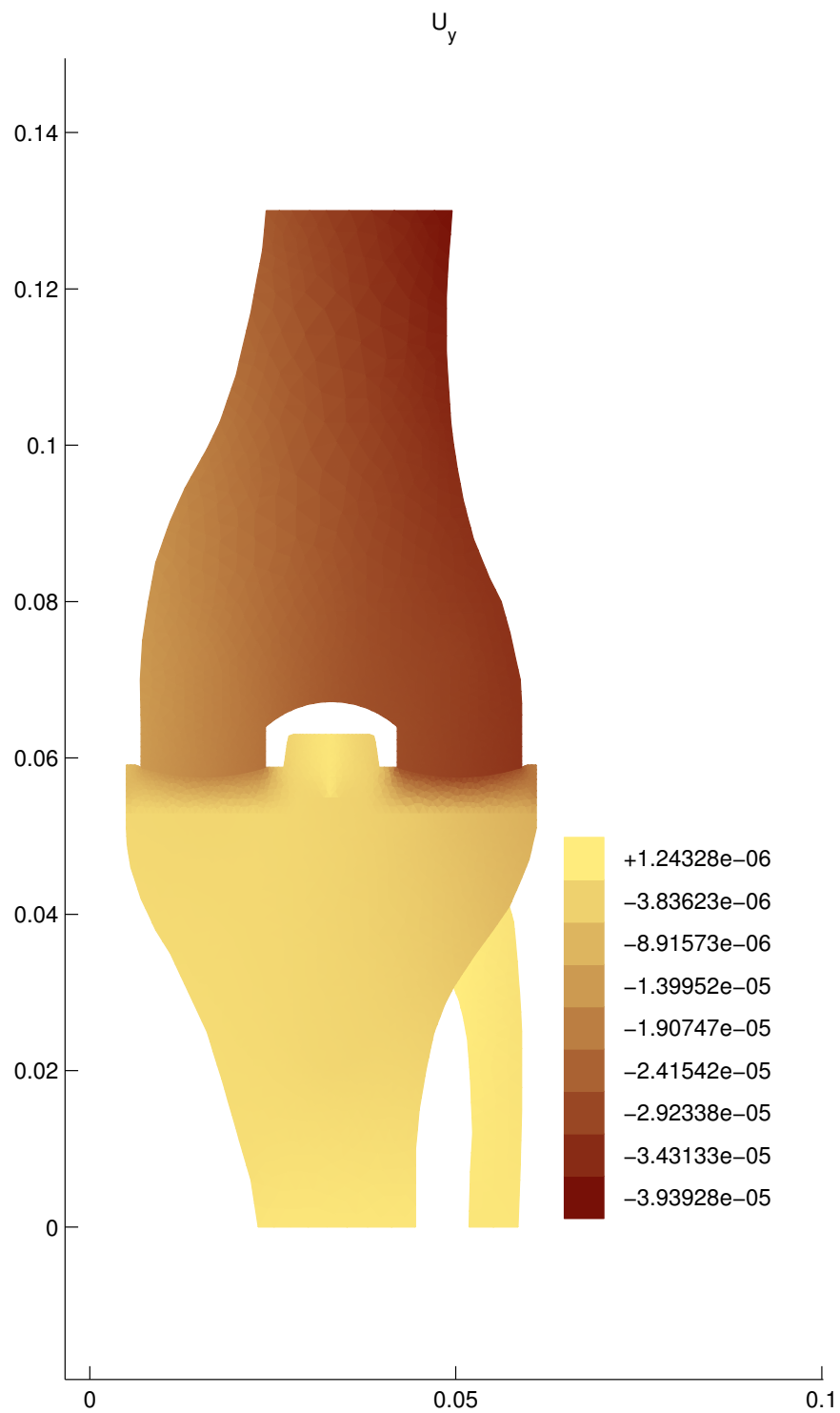


Figure 87: Model II - Vertical component of displacement

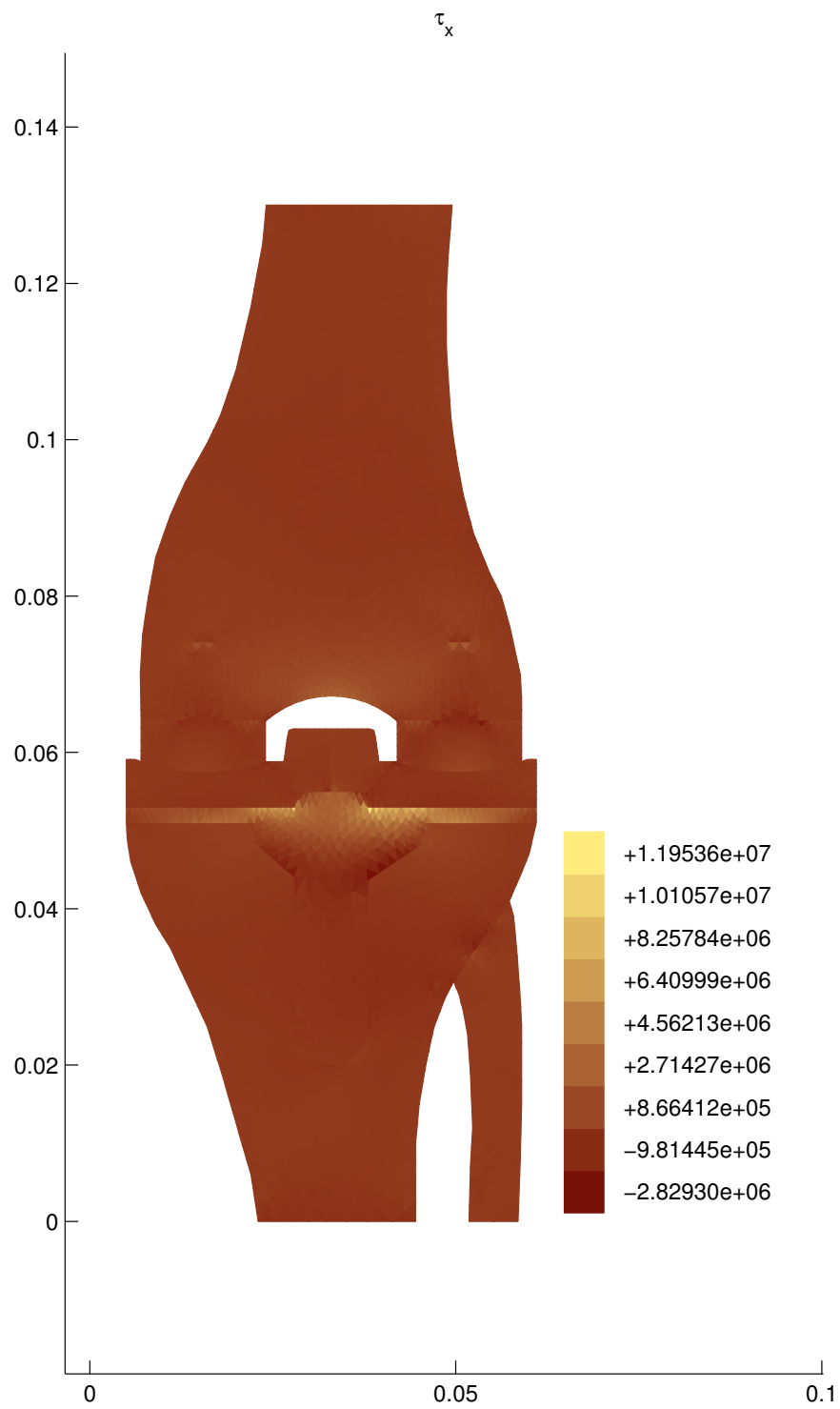


Figure 88: Model II - Stresses τ_x

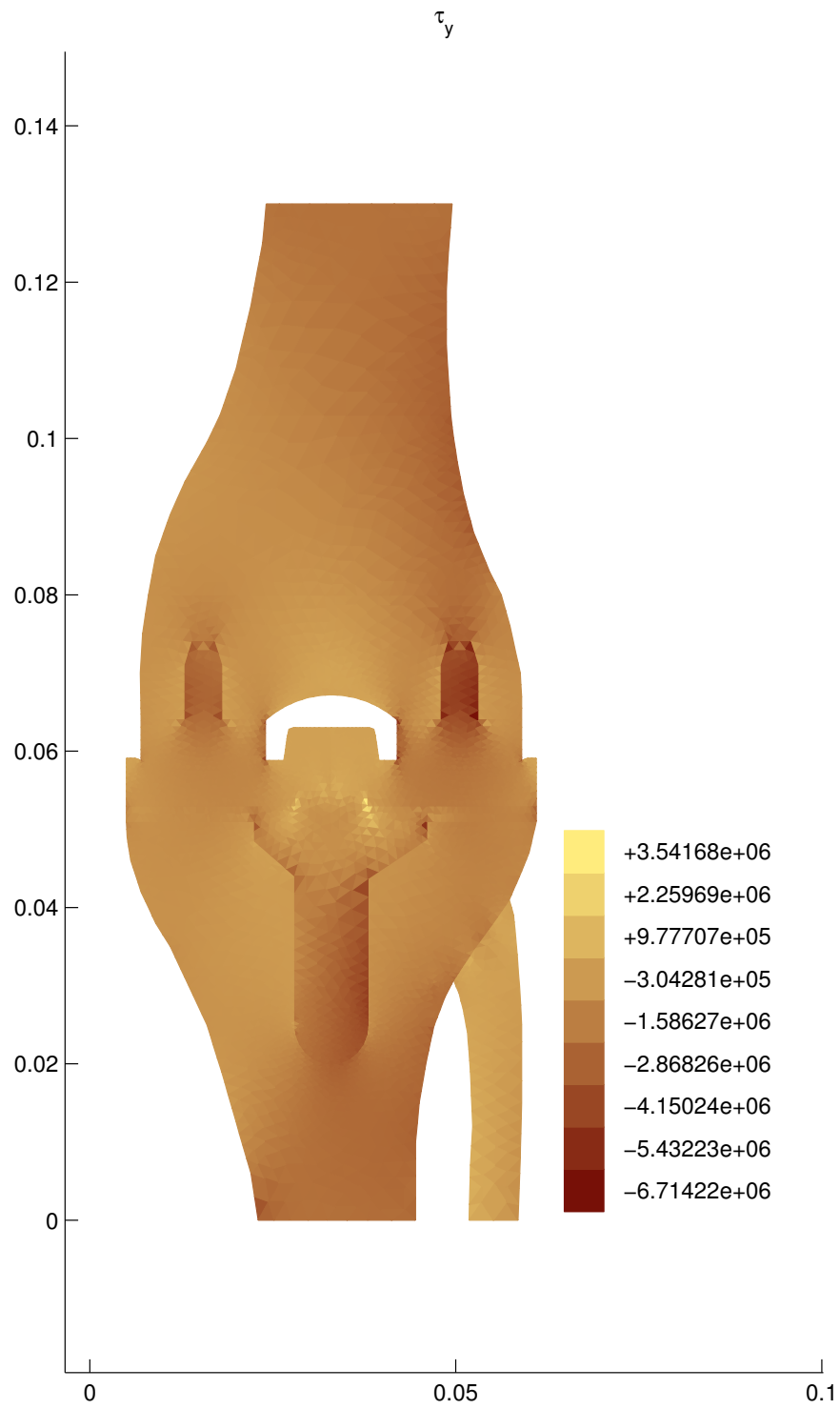


Figure 89: Model II - Stresses τ_y

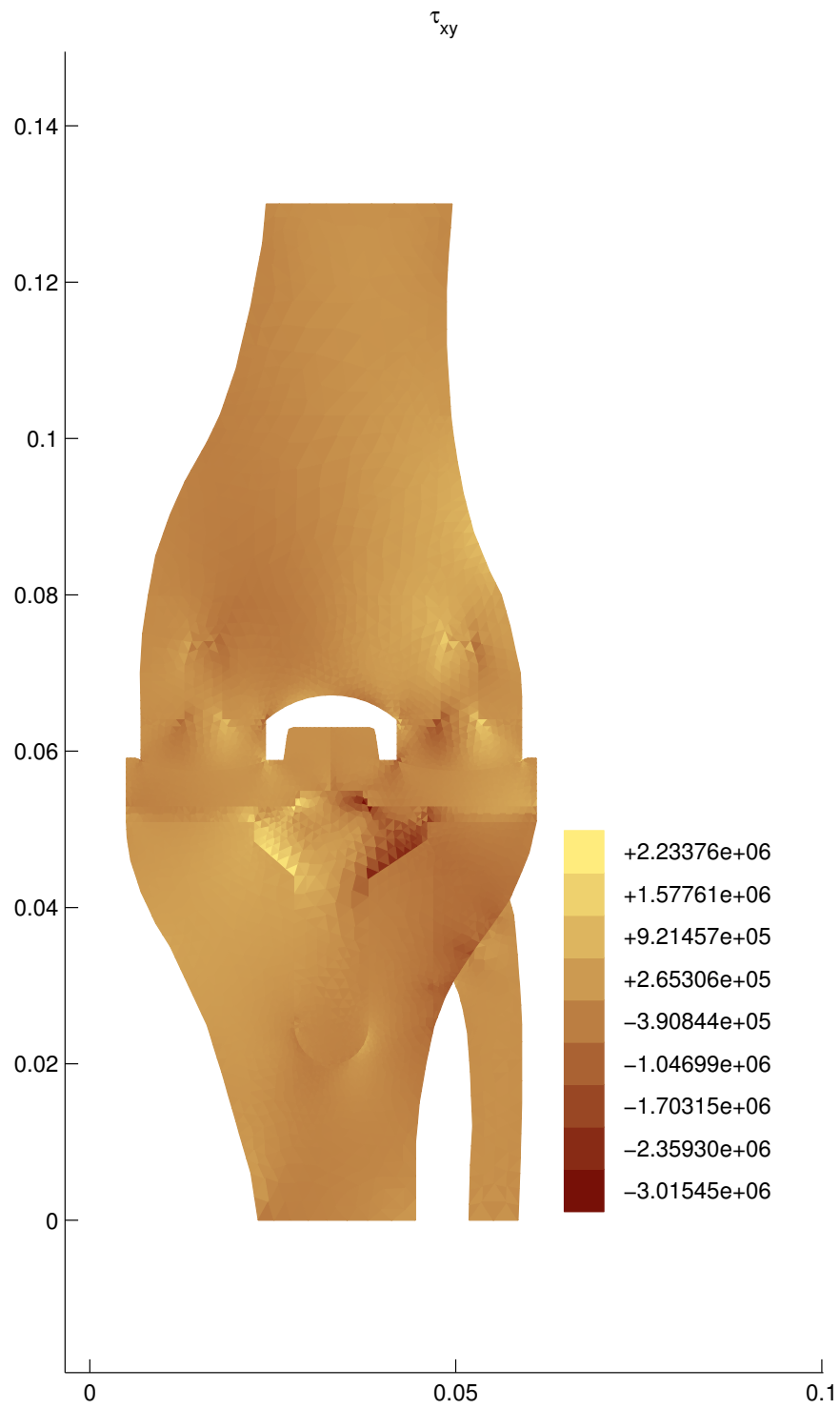


Figure 90: Model II - Stresses τ_{xy}

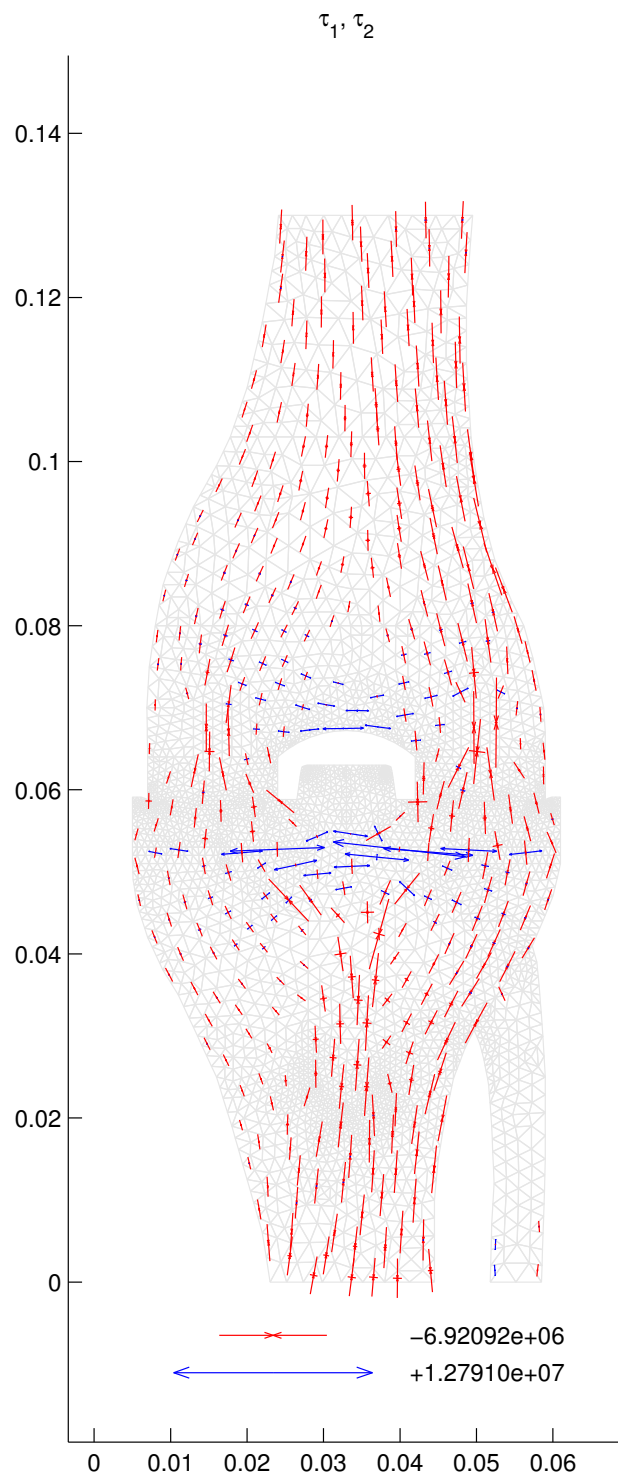


Figure 91: Model II - Principal stresses

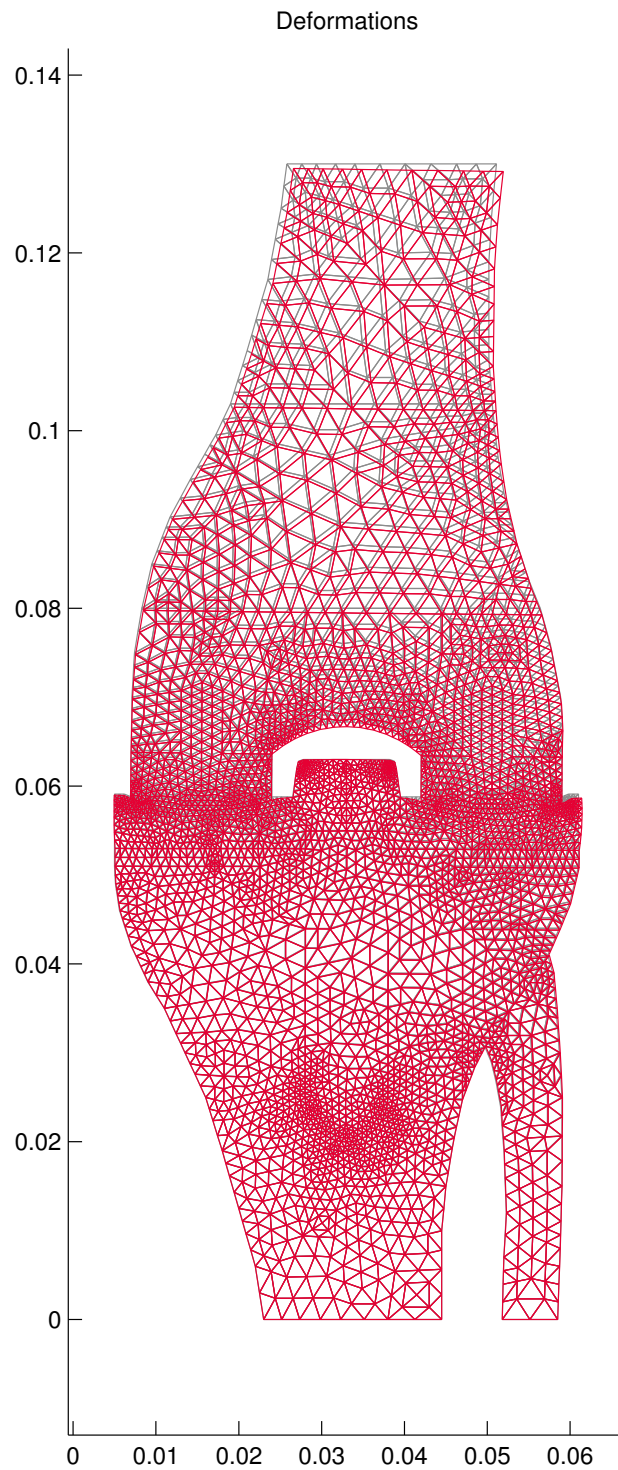


Figure 92: Model III - Deformations (enlarge factor=20)

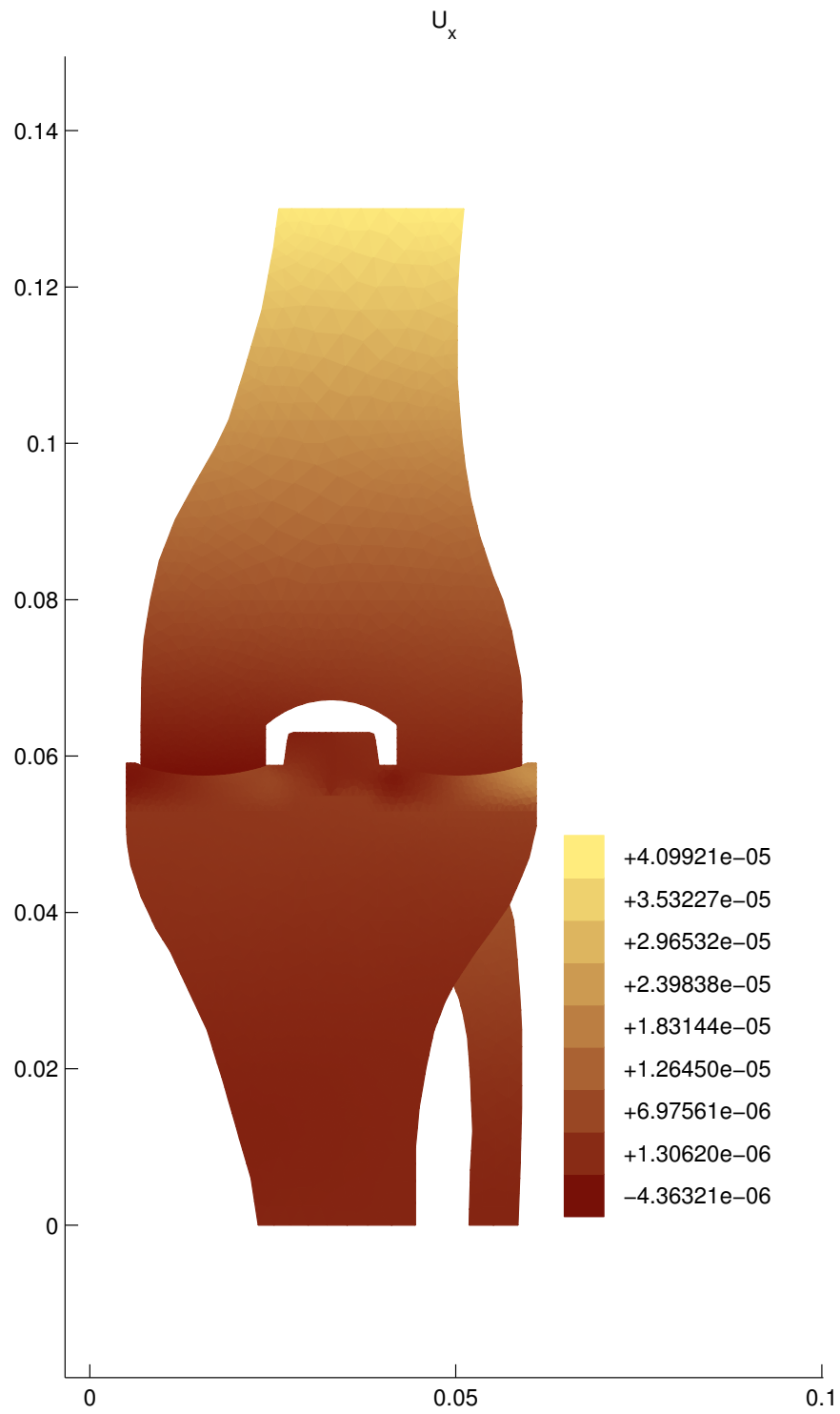


Figure 93: Model III - Horizontal component of displacement

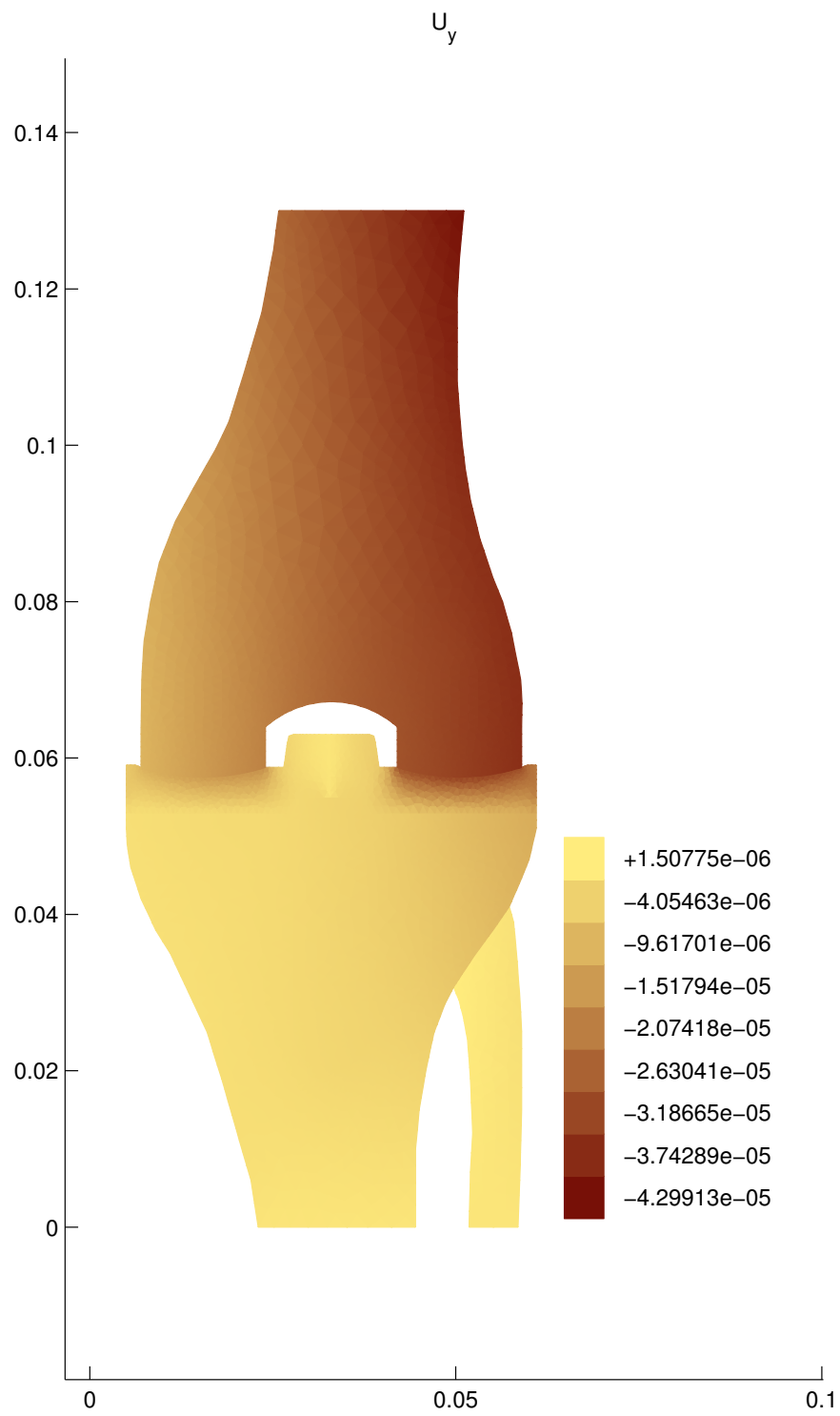


Figure 94: Model III - Vertical component of displacement

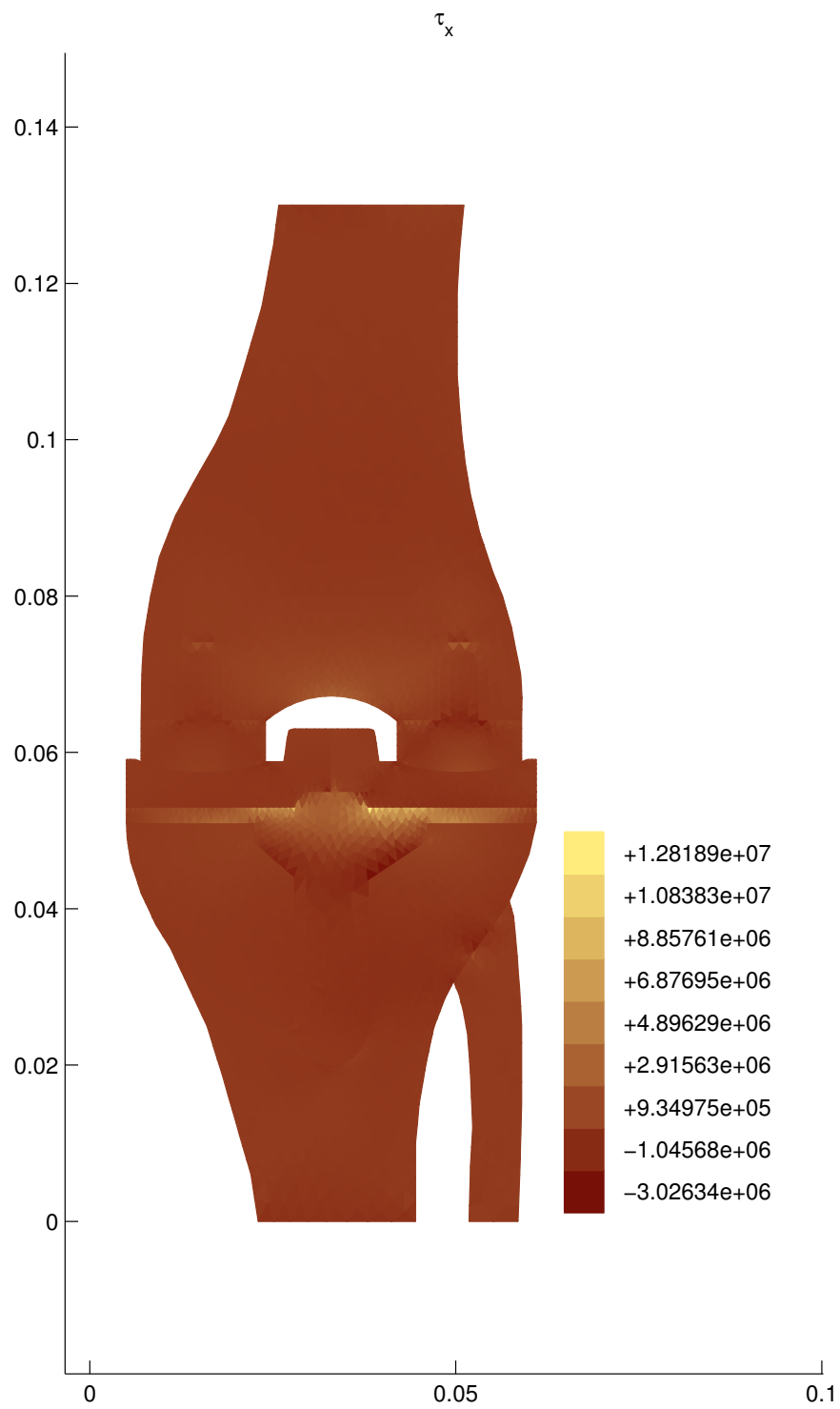


Figure 95: Model III - Stresses τ_x

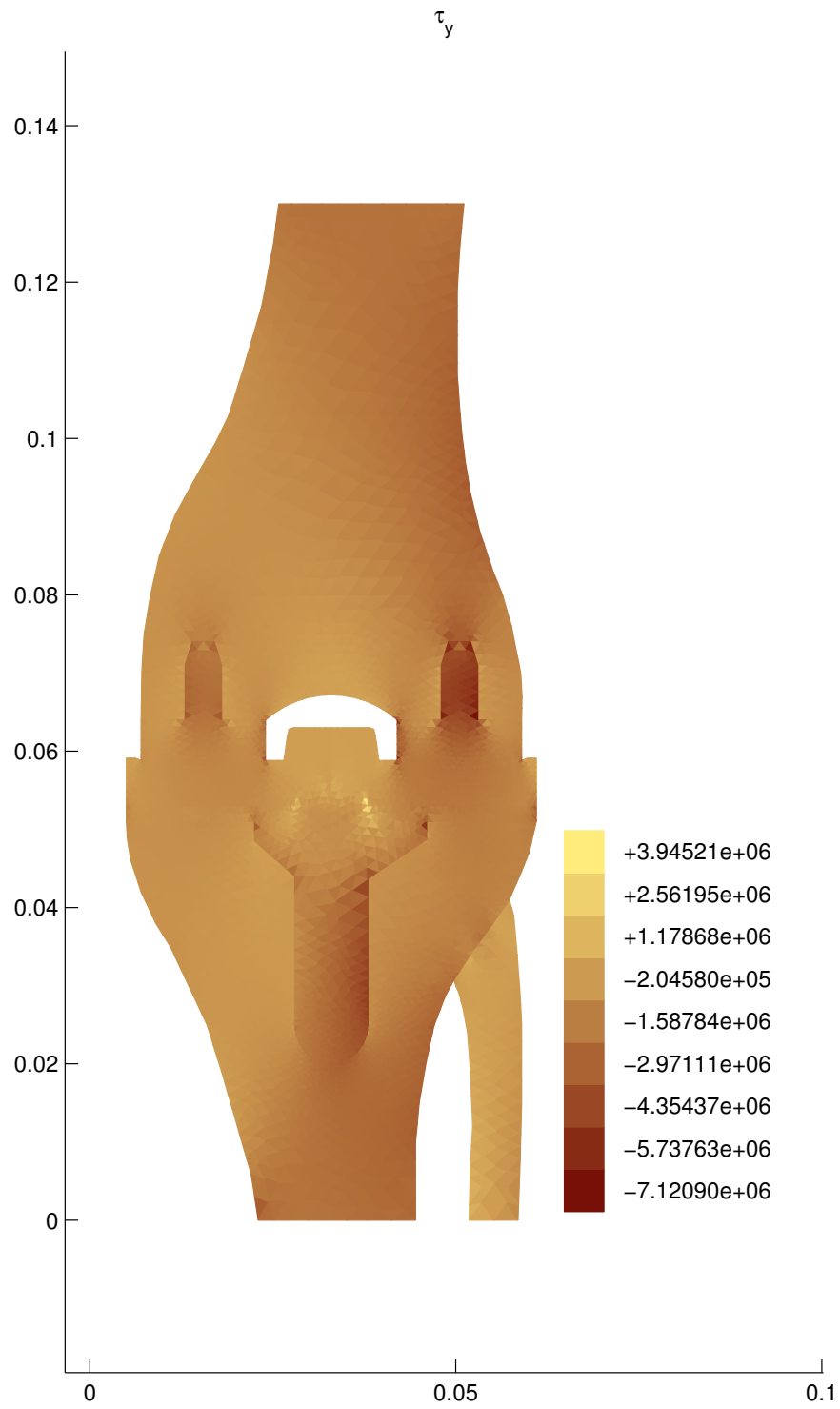


Figure 96: Model III - Stresses τ_y

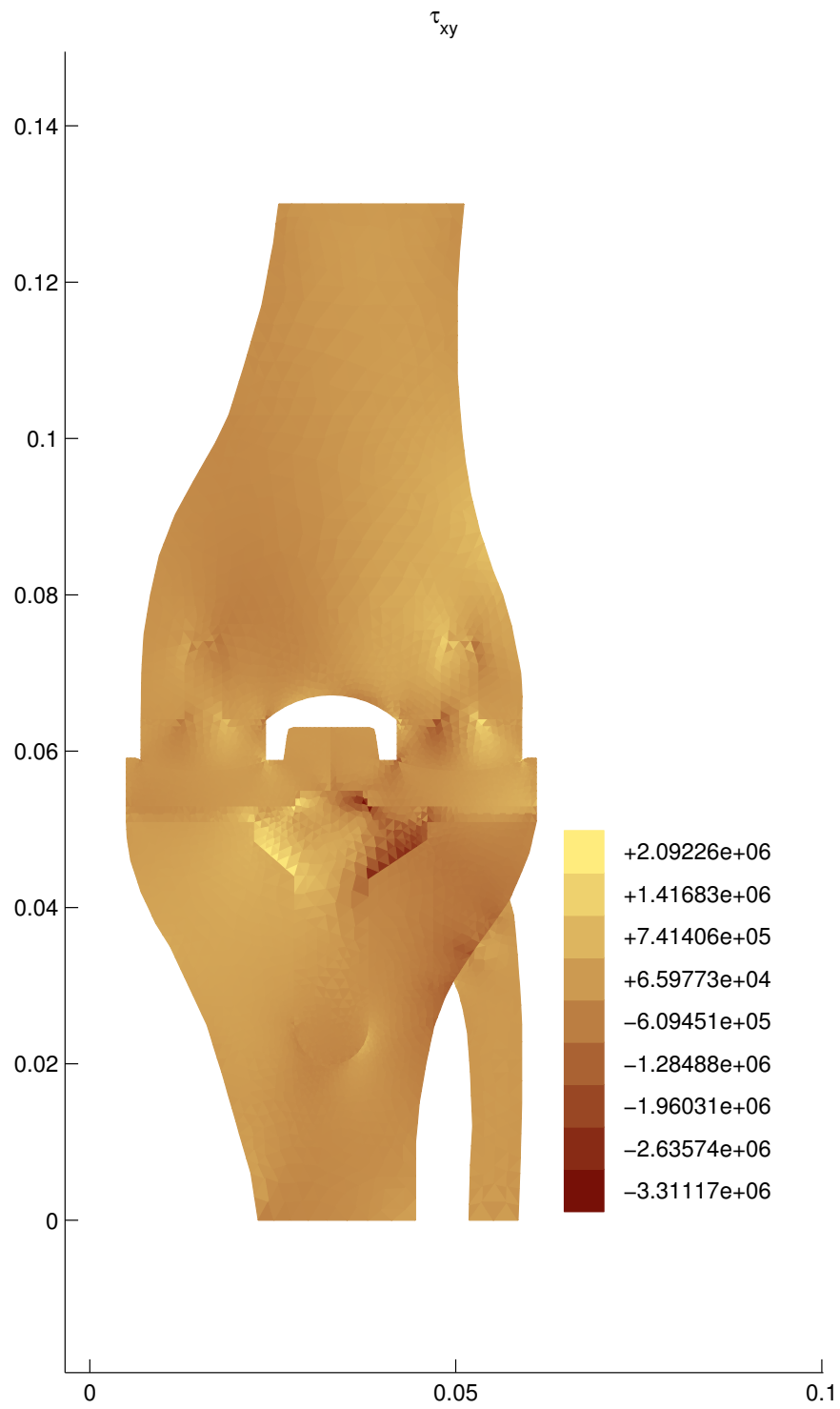


Figure 97: Model III - Stresses τ_{xy}

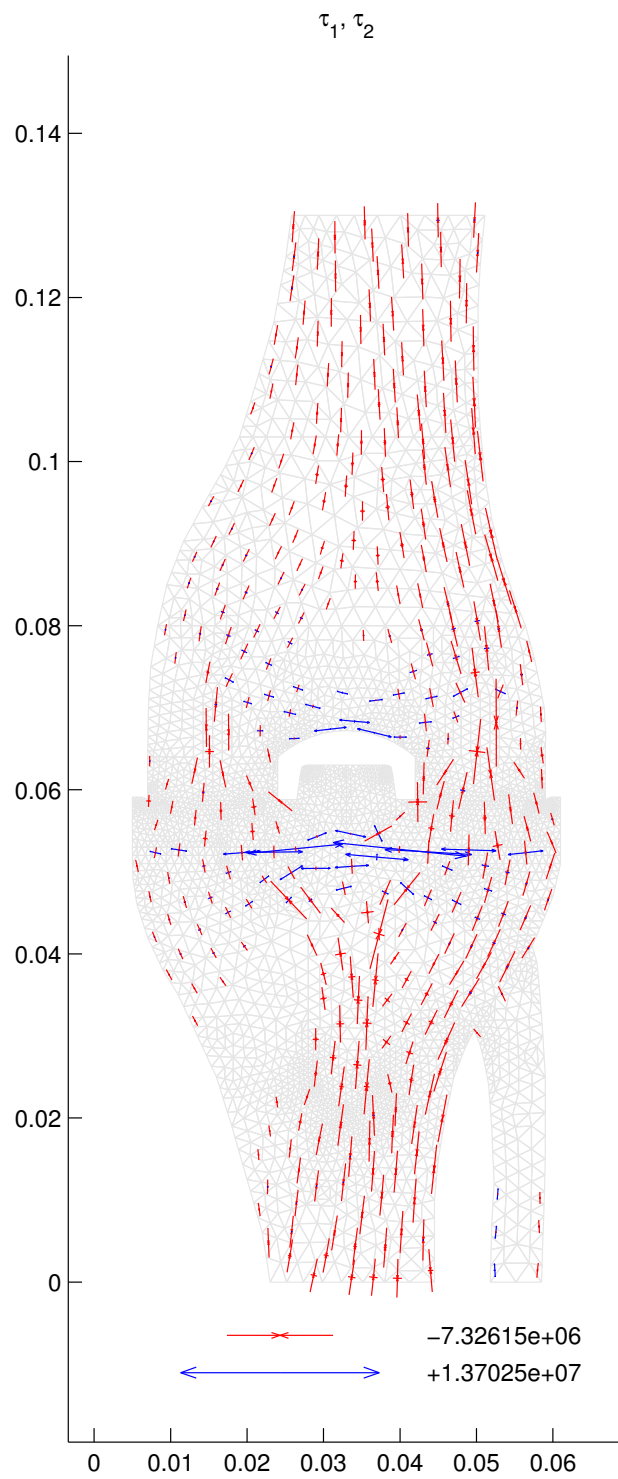


Figure 98: Model III - Principal stresses