

Numerical experiment 11

Material parameters:

Os - corticalis:

Young's modulus $E = 1,71 \times 10^{10}[\text{Pa}]$ and Poisson's ratio $\nu = 0,25$.

Os - spongy:

Young's modulus $E = 1,4 \times 10^{10}[\text{Pa}]$ and Poisson's ratio $\nu = 0,3$.

Os - pulp:

Young's modulus $E = 2 \times 10^6[\text{Pa}]$ and Poisson's ratio $\nu = 0,45$.

Ligament:

Young's modulus $E = 7 \times 10^4[\text{Pa}]$ and Poisson's ratio $\nu = 0,5$.

Cartilage:

Young's modulus $E = 0,492 \times 10^9[\text{Pa}]$ and Poisson's ratio $\nu = 0,1$.

Meniscus:

Young's modulus $E = 2 \times 10^6[\text{Pa}]$ and Poisson's ratio $\nu = 0,2$.

Boundary conditions:

Model VI

Prescribed zero displacement on 1-2, 3-4.

Unilateral contact boundary on 5a-6a, 5b-6b, 7a-8a, 7b-8b, 9-10.

Pressure $2,15 \times 10^6[\text{Pa}]$ on 11-12, 13-14.

Discretization statistics:

Model VI

19 subdomains, 2349 nodes, 4056 elements,

106 unilateral contact conditions, 396 interface elements.

Description:

Model VI - correspond to the case of healthy knee joint in the frontal plane

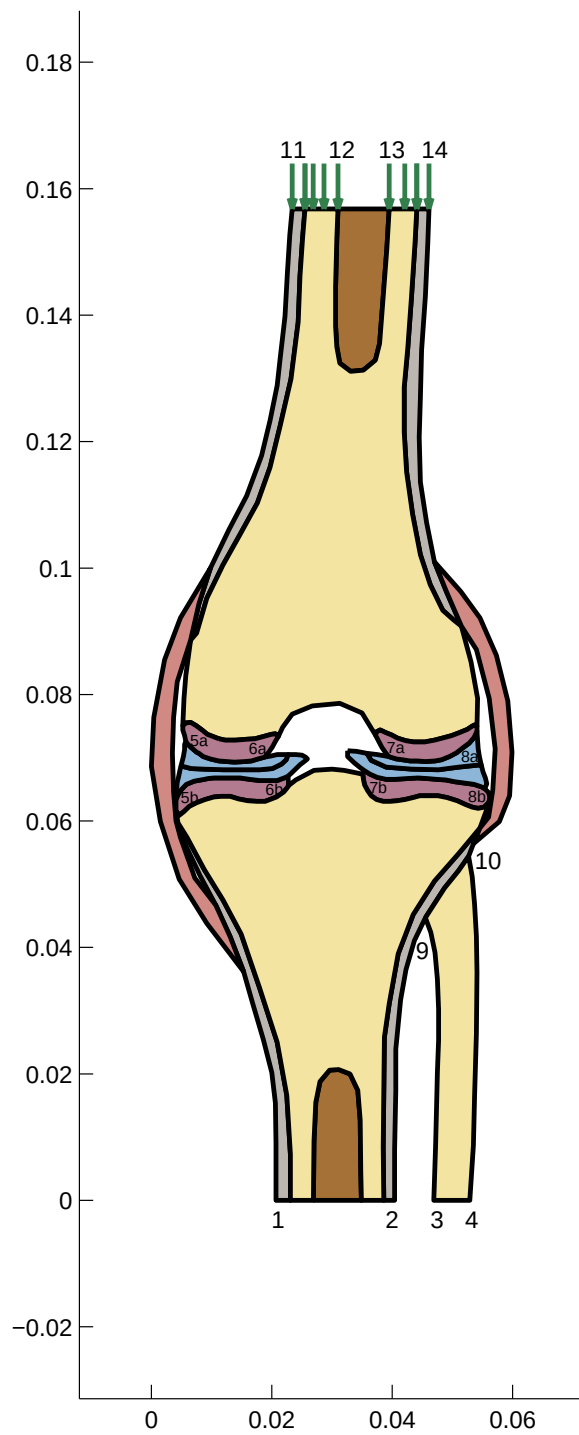


Figure 1: The geometry of the model VI

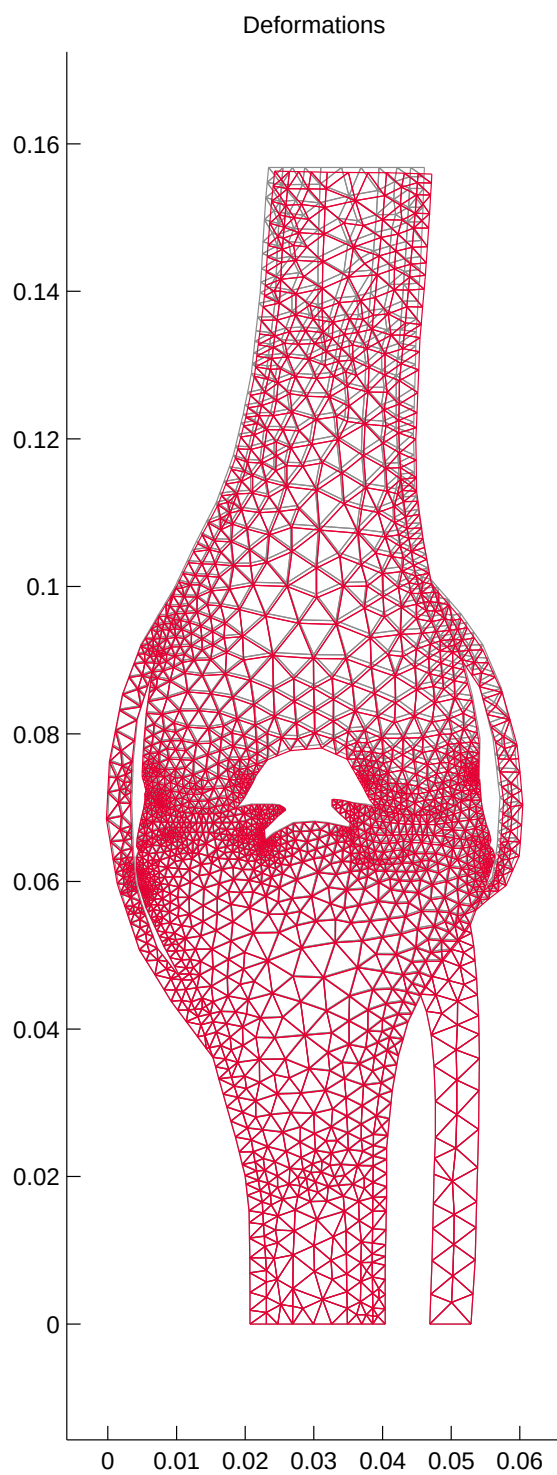


Figure 2: Model VI - Deformations (enlarge factor=20)

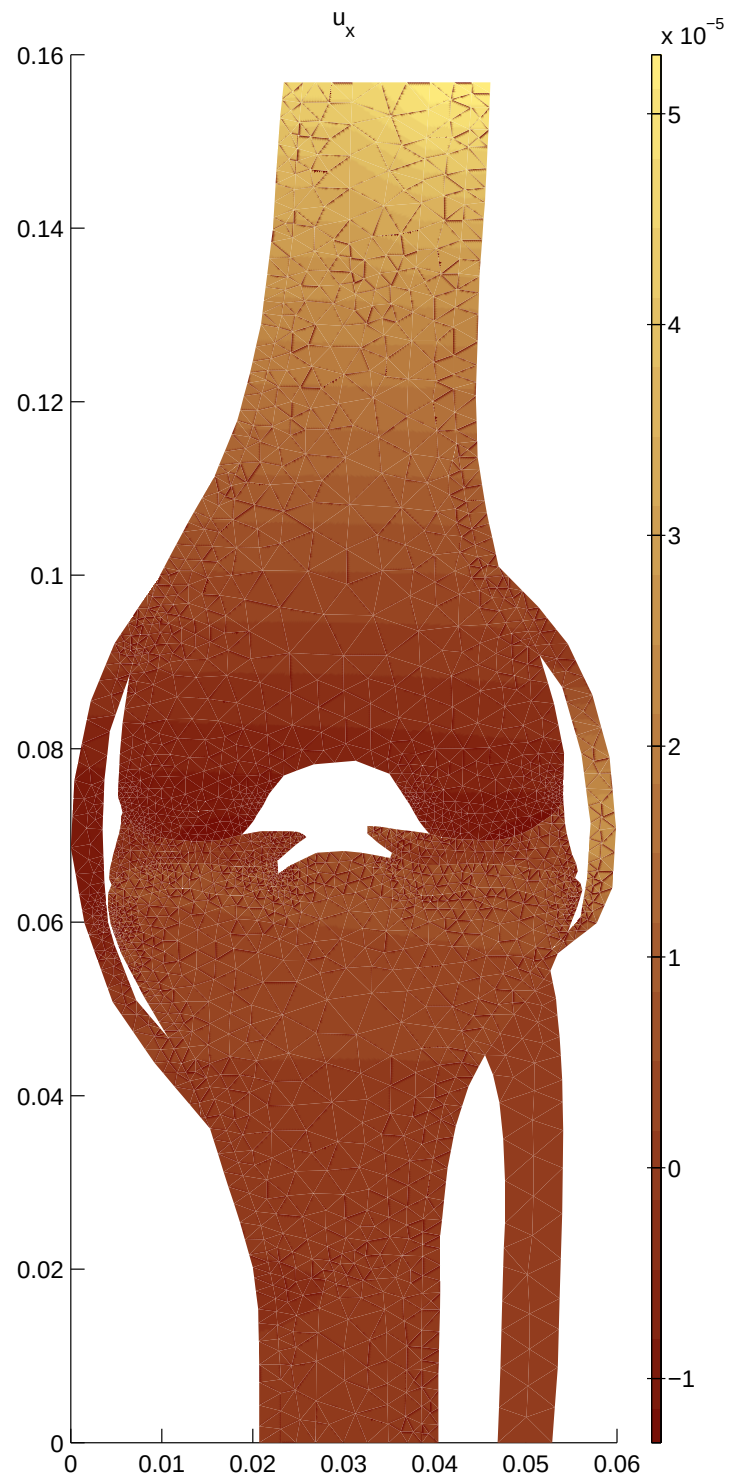


Figure 3: Model VI - Horizontal component of displacement

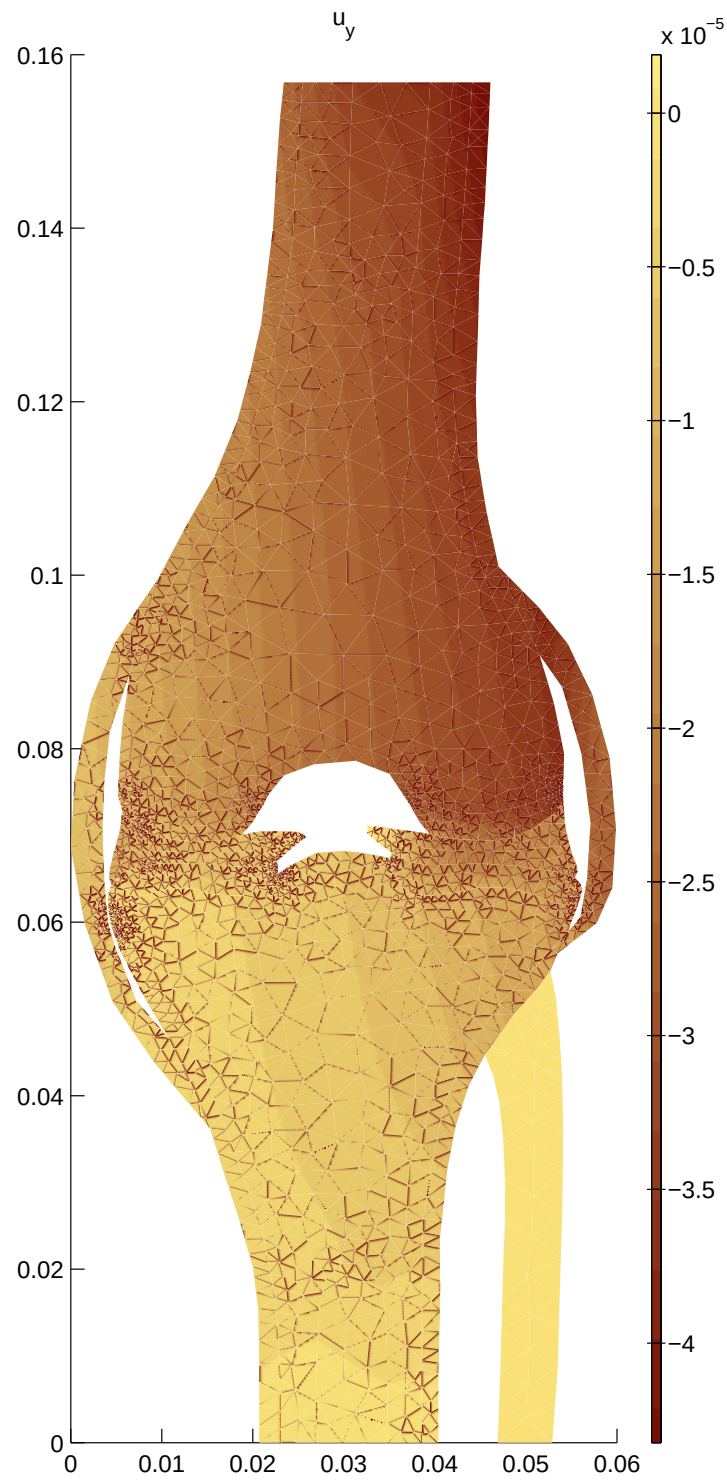


Figure 4: Model VI - Vertical component of displacement

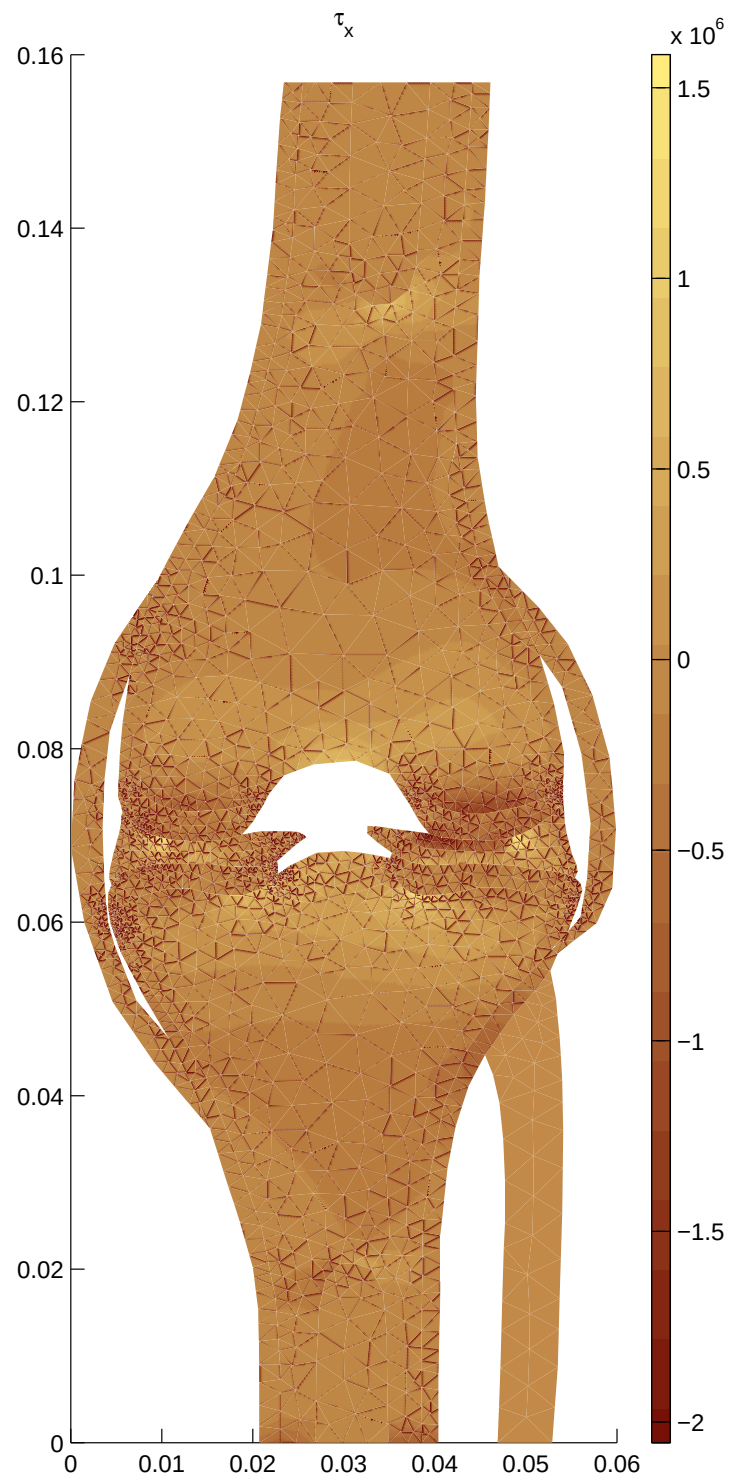


Figure 5: Model VI - Stresses τ_x

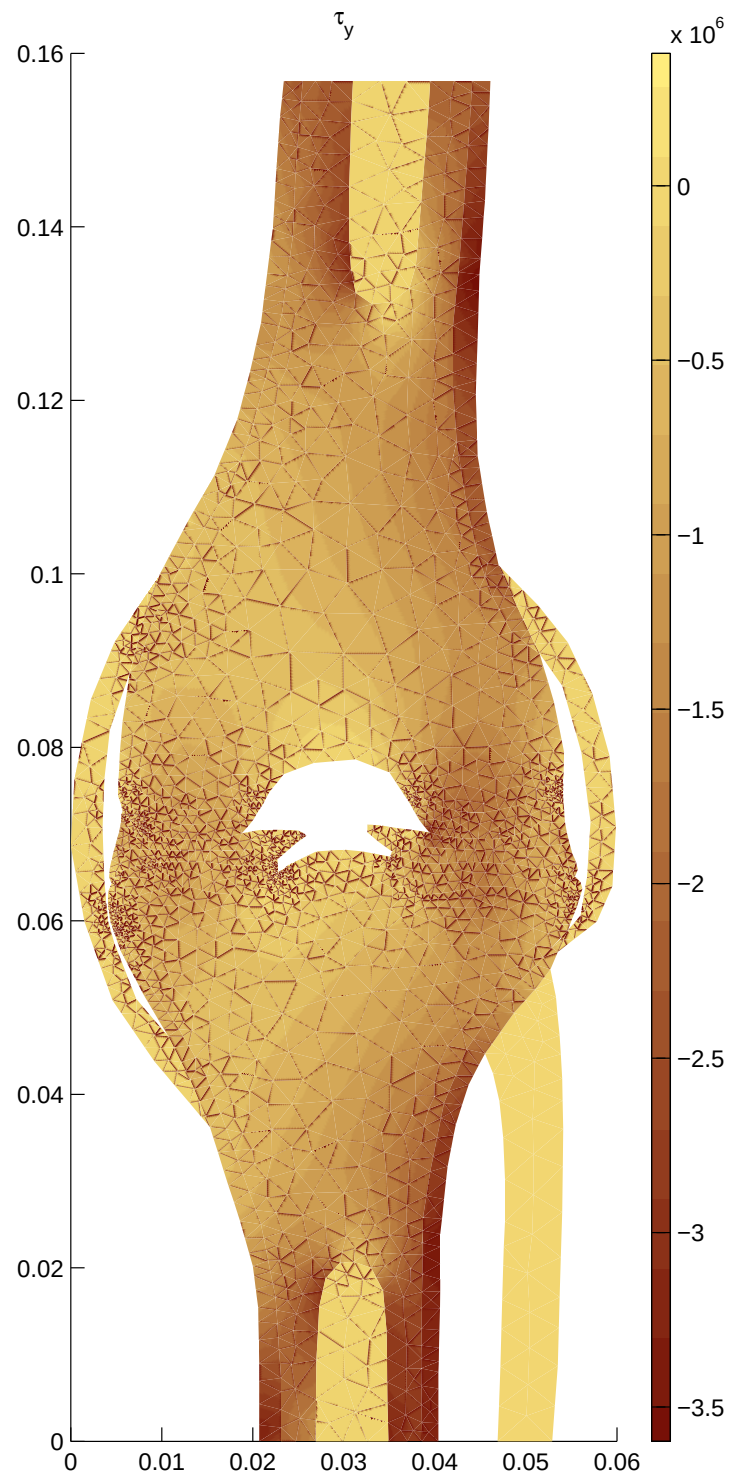


Figure 6: Model VI - Stresses τ_y

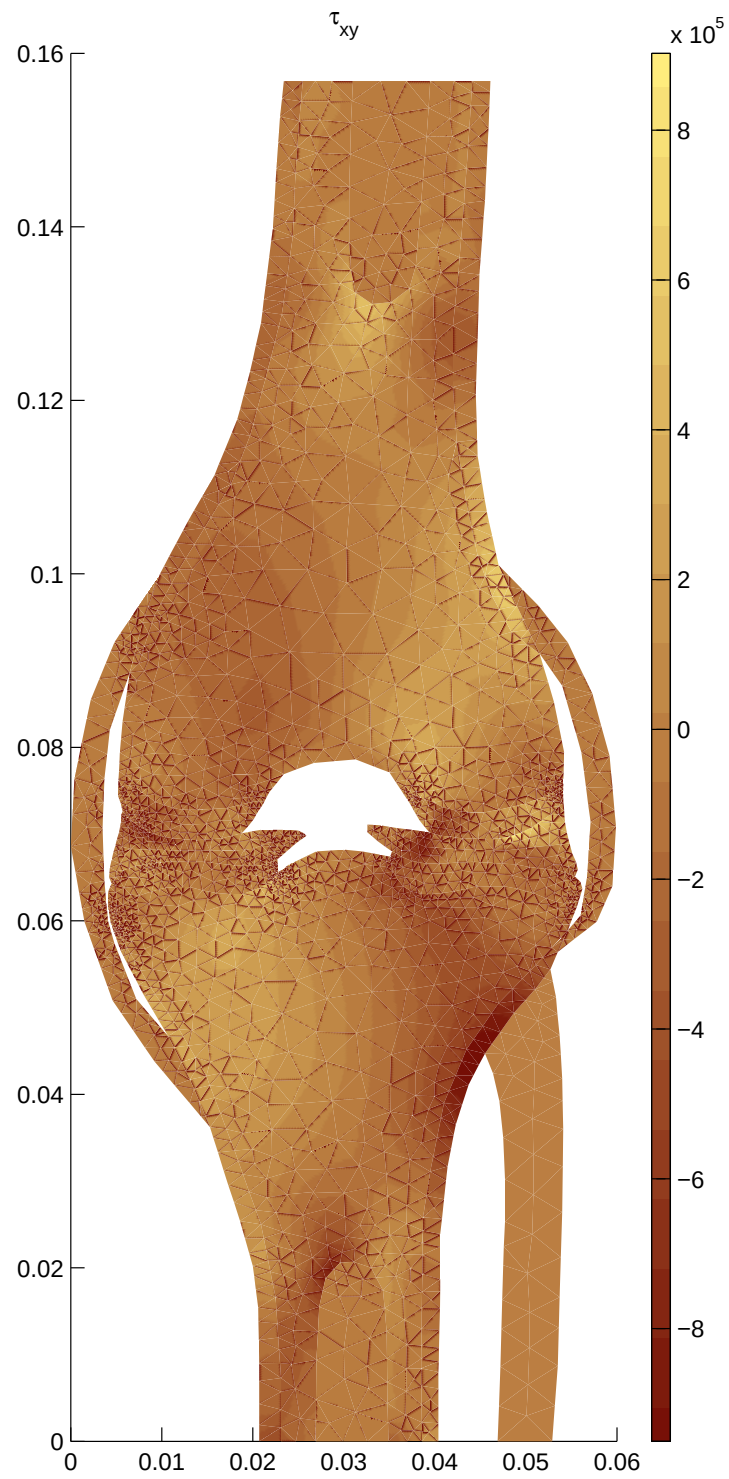


Figure 7: Model VI - Stresses τ_{xy}

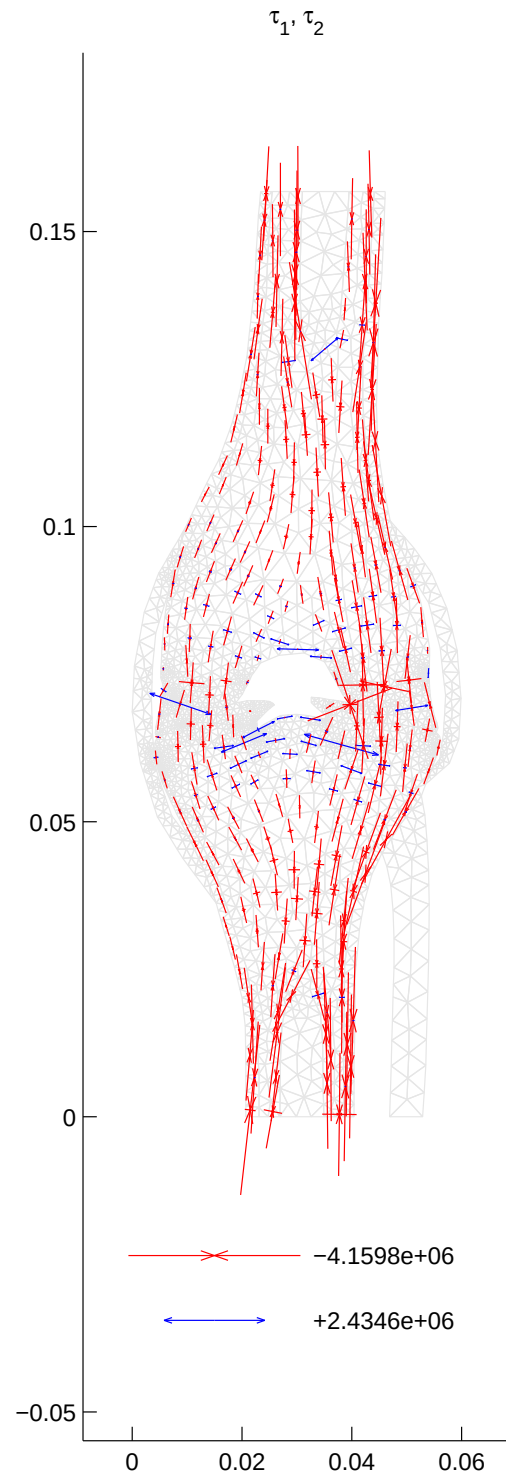


Figure 8: Model VI - Principal stresses

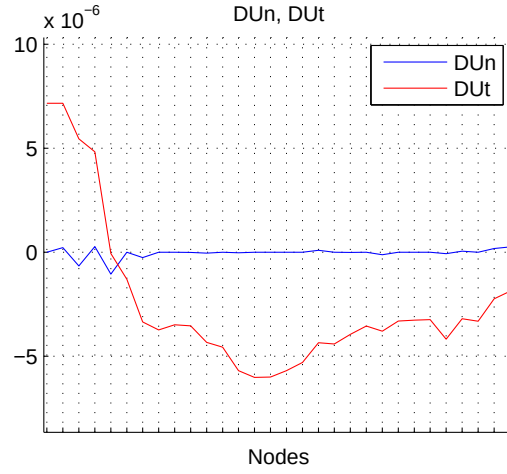


Figure 9: Model VI - The normal and tangential components of displacement on the contact boundary 5b-6b

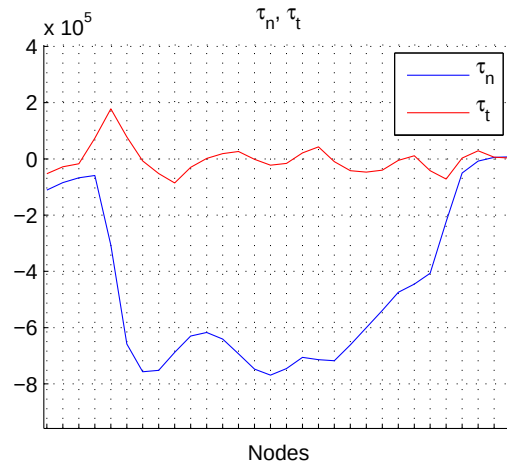


Figure 10: Model VI - The normal and tangential components of stress vector on the contact boundary 5b-6b

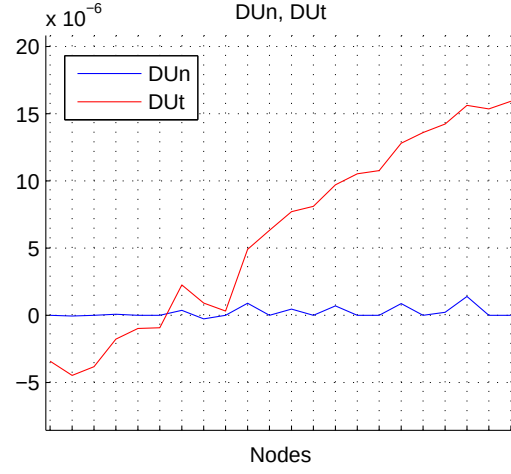


Figure 11: Model VI - The normal and tangential components of displacement on the contact boundary 5a-6a

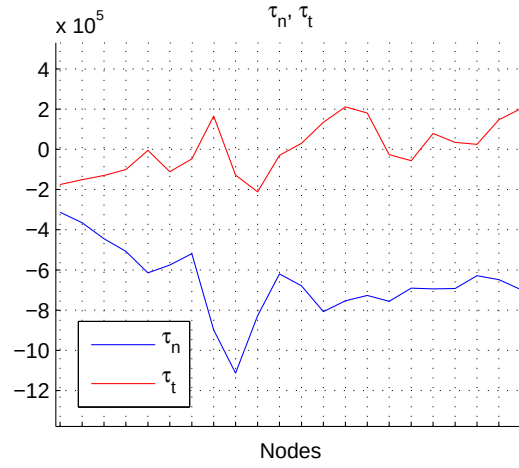


Figure 12: Model VI - The normal and tangential components of stress vector on the contact boundary 5a-6a

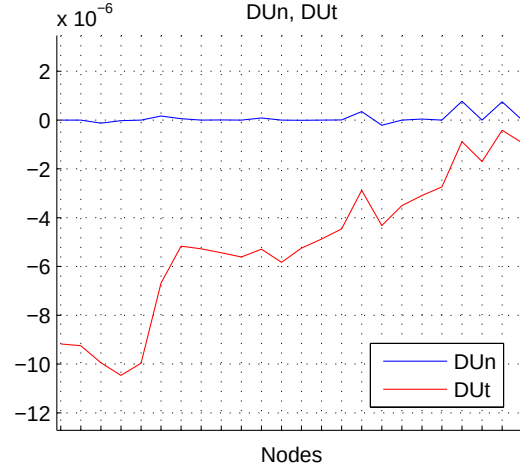


Figure 13: Model VI - The normal and tangential components of displacement on the contact boundary 7b-8b

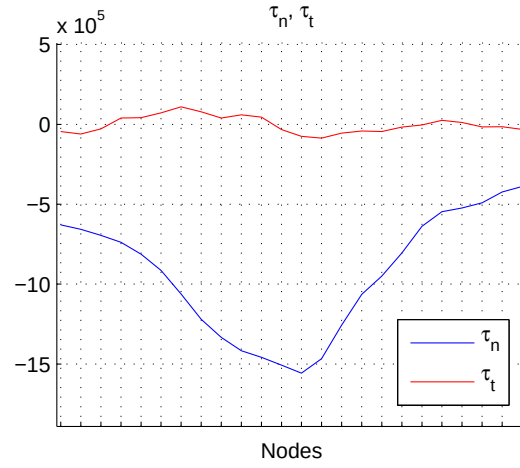


Figure 14: Model VI - The normal and tangential components of stress vector on the contact boundary 7b-8b

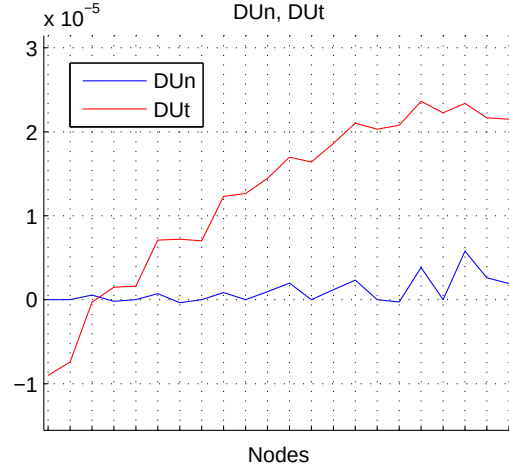


Figure 15: Model VI - The normal and tangential components of displacement on the contact boundary 7a-8a

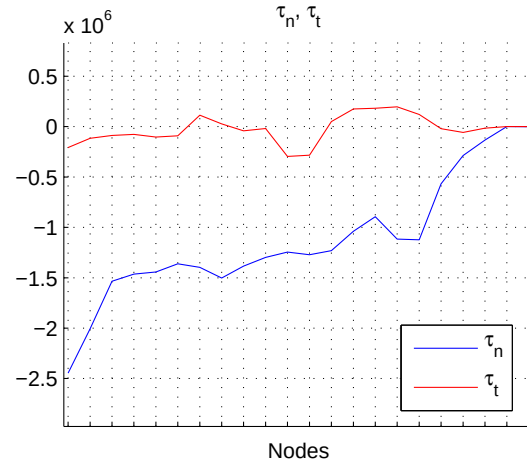


Figure 16: Model VI - The normal and tangential components of stress vector on the contact boundary 7a-8a

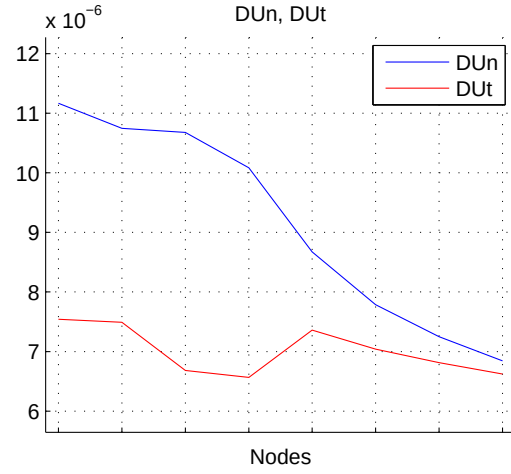


Figure 17: Model VI - The normal and tangential components of displacement on the contact boundary 9-10

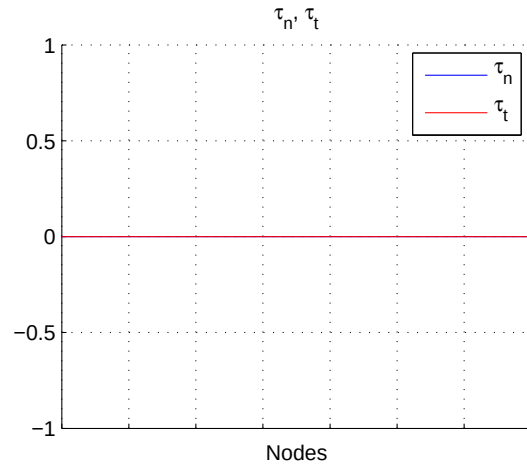


Figure 18: Model VI - The normal and tangential components of stress vector on the contact boundary 9-10