

Numerical experiment 2

Material parameters:

Young's modulus $E = 0.52^{10}[\text{Pa}]$ and Poisson's ratio $\nu = 0,18$.

Boundary conditions:

Prescribed displacement $(-1.0 \times 10^{-1}, 0)$ [m] on 3-4.

Pressure $0,5 \times 10^7[\text{Pa}]$ on 1-4.

Bilateral contact boundary: 1-2 and 2-3.

Unilateral contact boundary: 5-6 and 7-8.

Discretization statistics:

12 subdomains, 5501 nodes, 9676 elements, 10428 unknowns,

89 unilateral contact conditions, 466 interface elements.

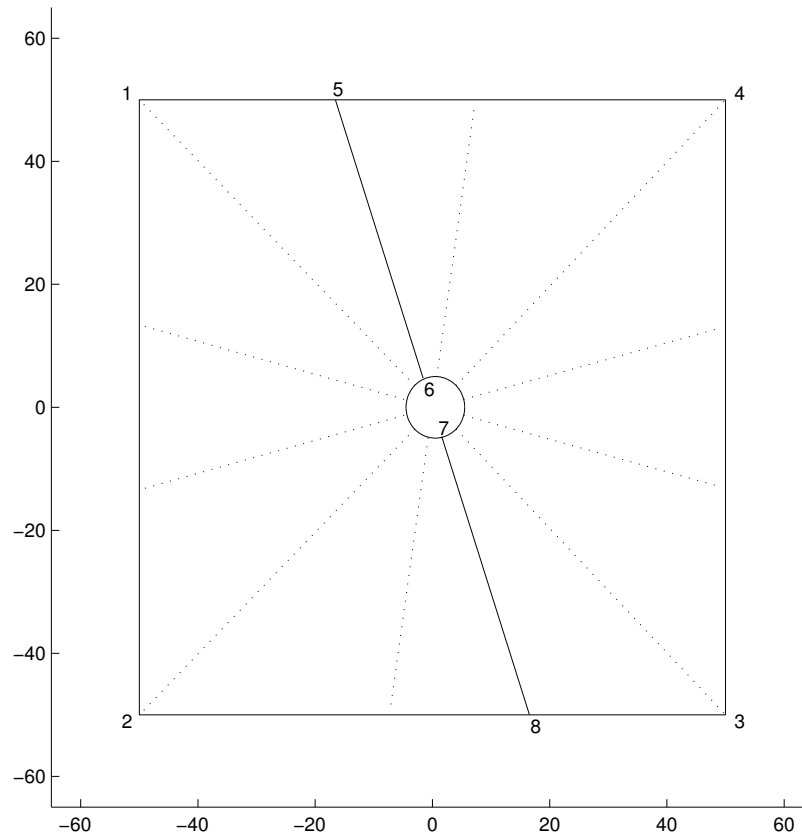


Figure 17: Problem 2 - geometry

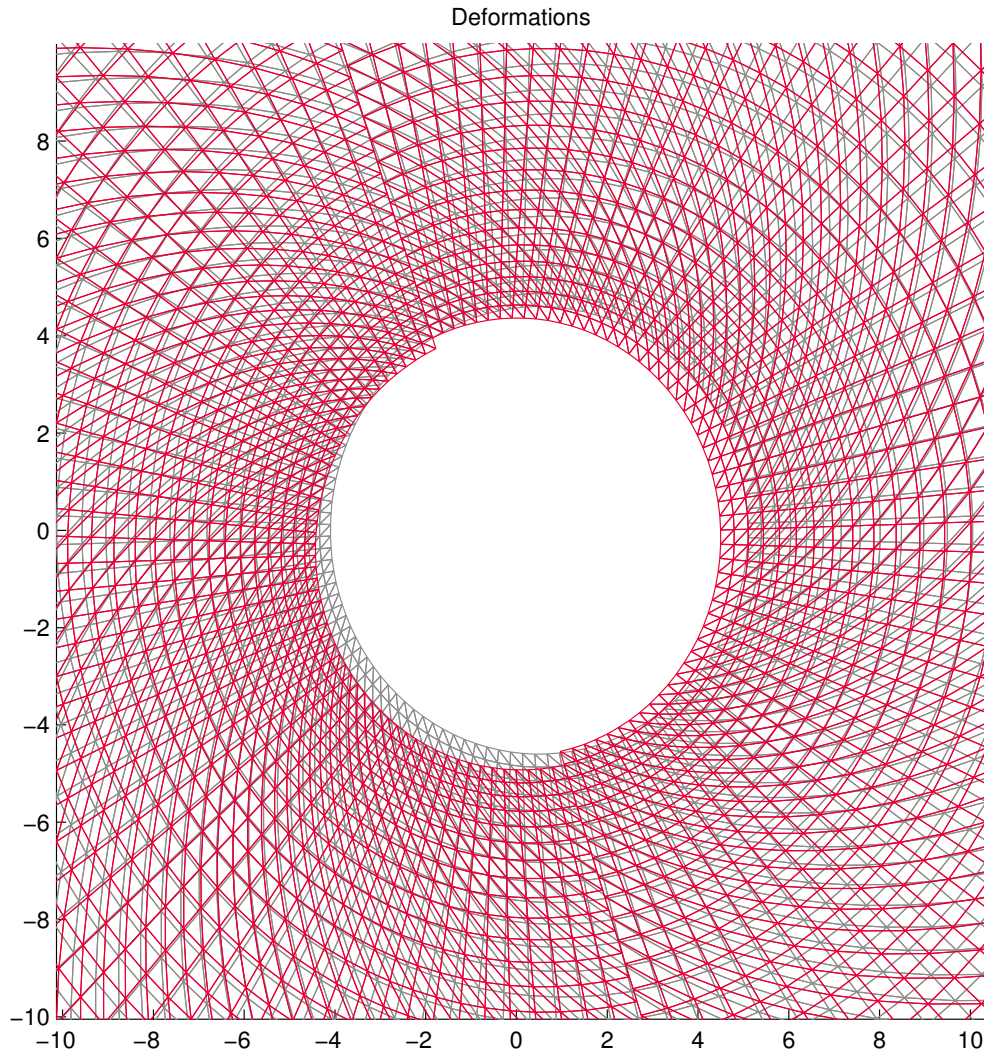


Figure 18: Problem 2 - A detail of deformations (enlarge factor=10)

Boundary conditions:

Prescribed displacement $(-1 \times 10^{-1}, 0)$ [m] on 3-4.

Pressure $0,5 \times 10^7$ [Pa] on 1-4.

Bilateral contact boundary: 1-2 and 2-3.

Unilateral contact boundary: 5-6 and 7-8.

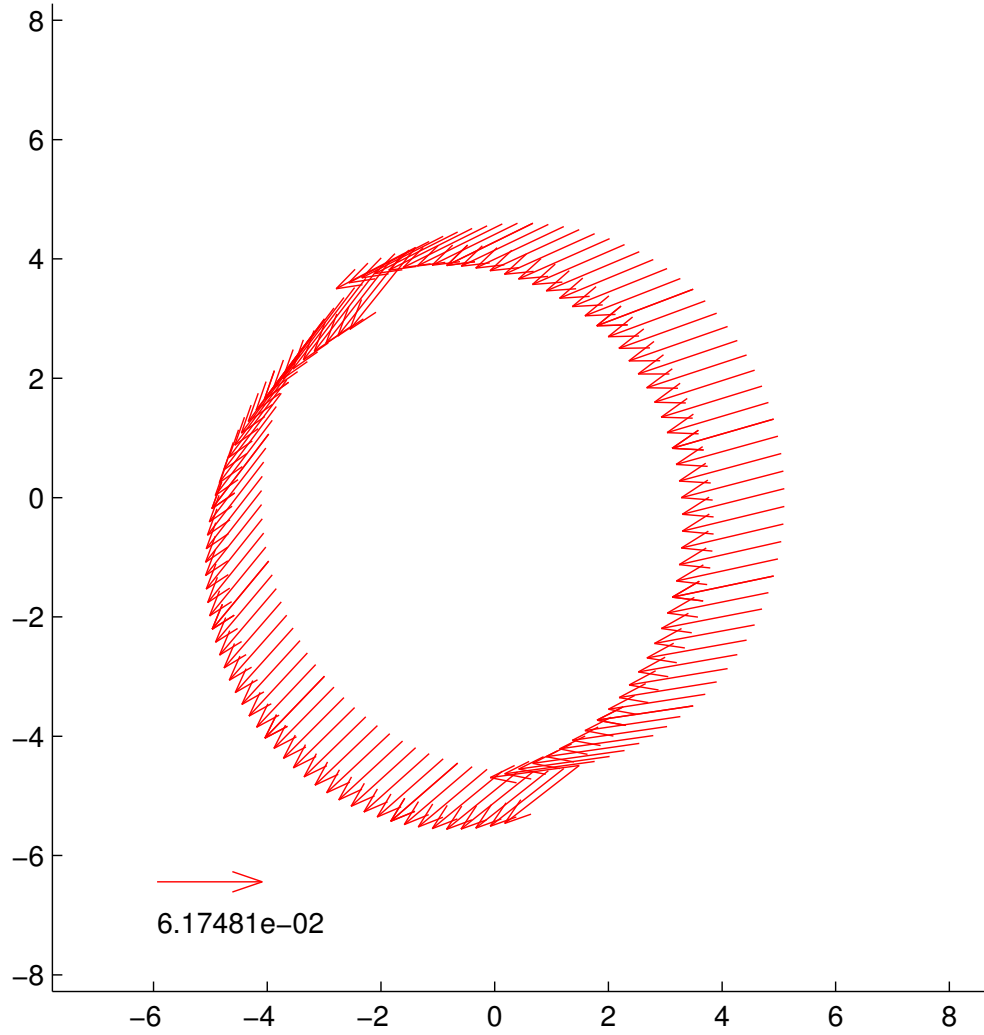


Figure 19: Problem 2 - A detail of deformations

Boundary conditions:

Prescribed displacement $(-1 \times 10^{-1}, 0)$ [m] on 3-4.

Pressure $0,5 \times 10^7$ [Pa] on 1-4.

Bilateral contact boundary: 1-2 and 2-3.

Unilateral contact boundary: 5-6 and 7-8.

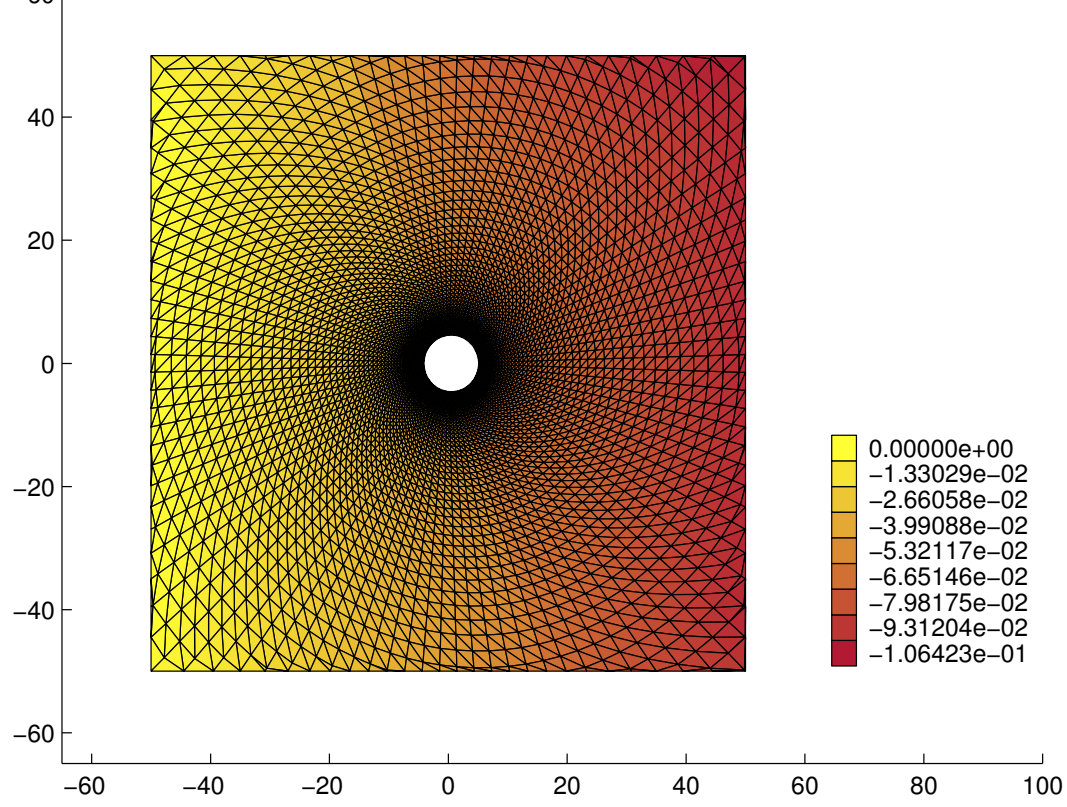


Figure 20: Problem 2 - horizontal component of displacement

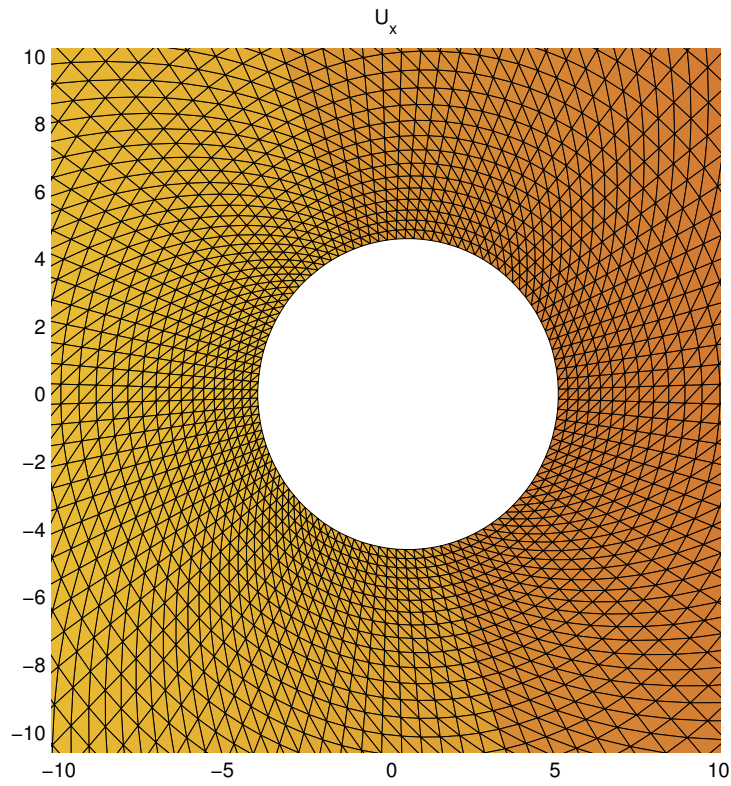


Figure 21: Problem 2 - detail of horizontal component of displacement

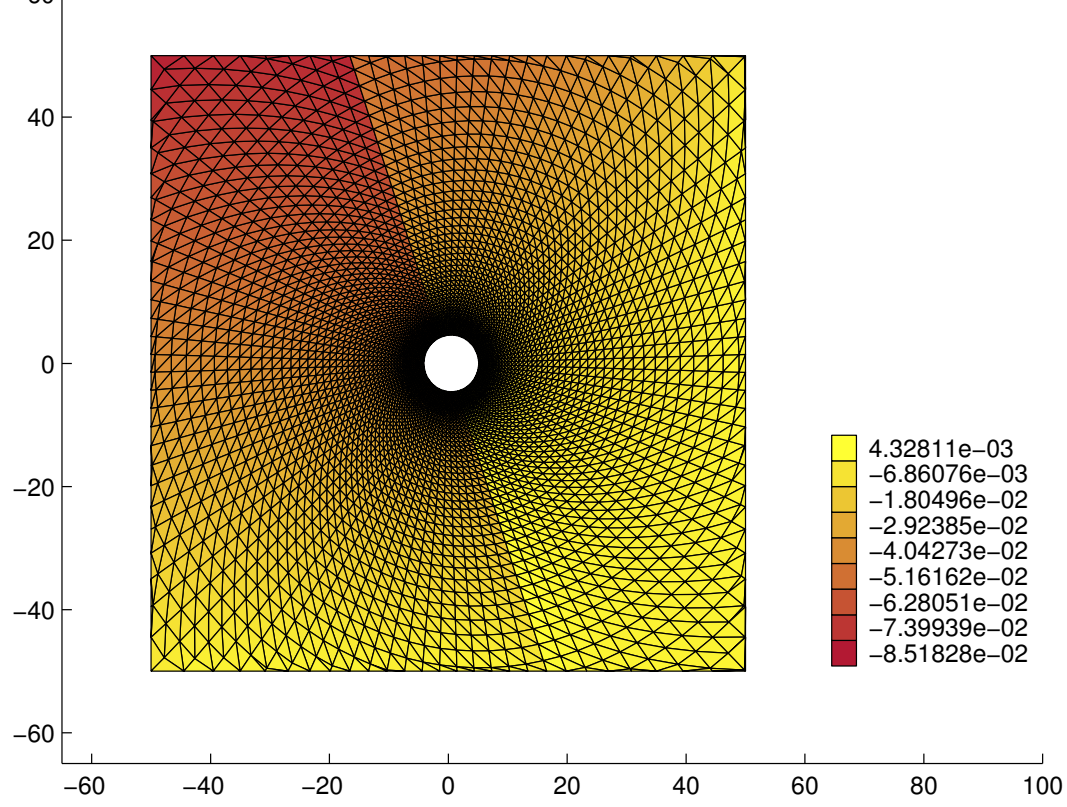


Figure 22: Problem 2 - vertical component of displacement

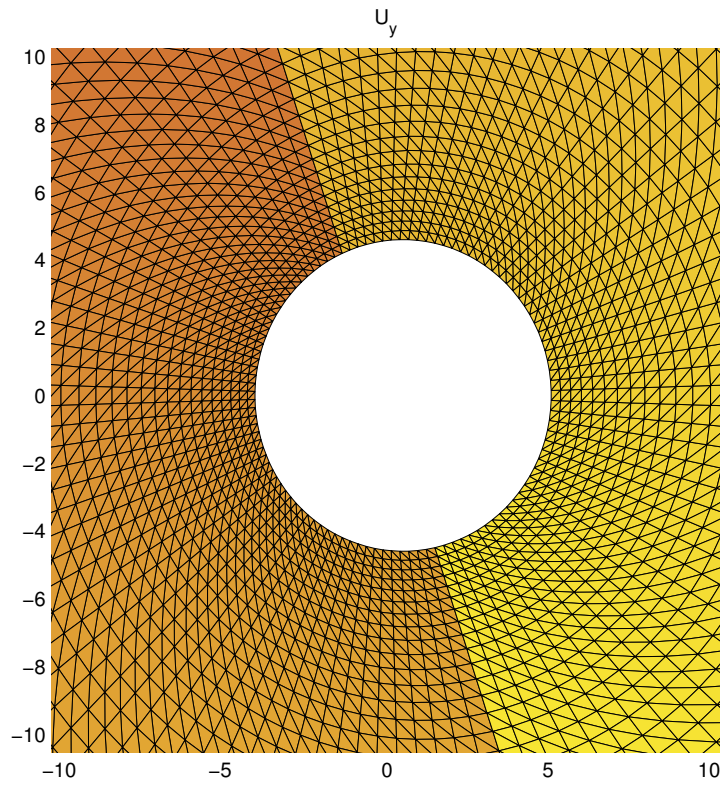


Figure 23: Problem 2 - detail of vertical component of displacement

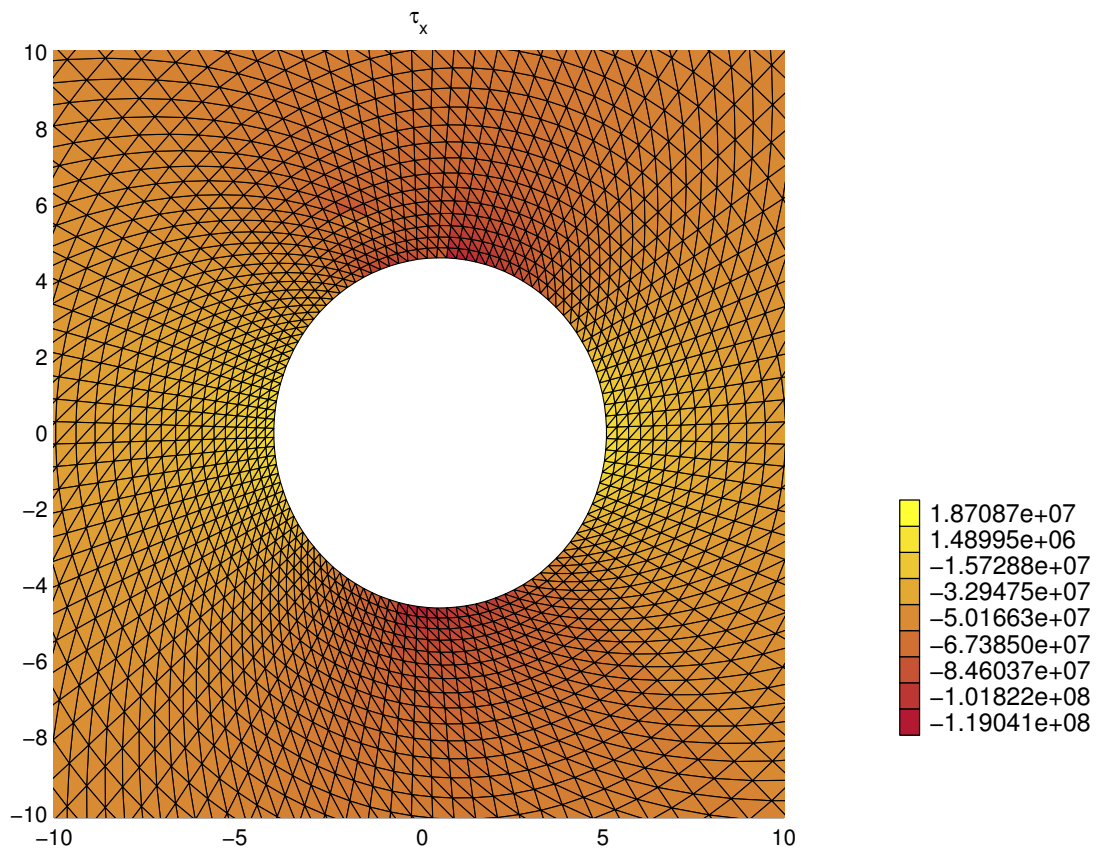


Figure 24: Problem 2 - A detail of stresses τ_x

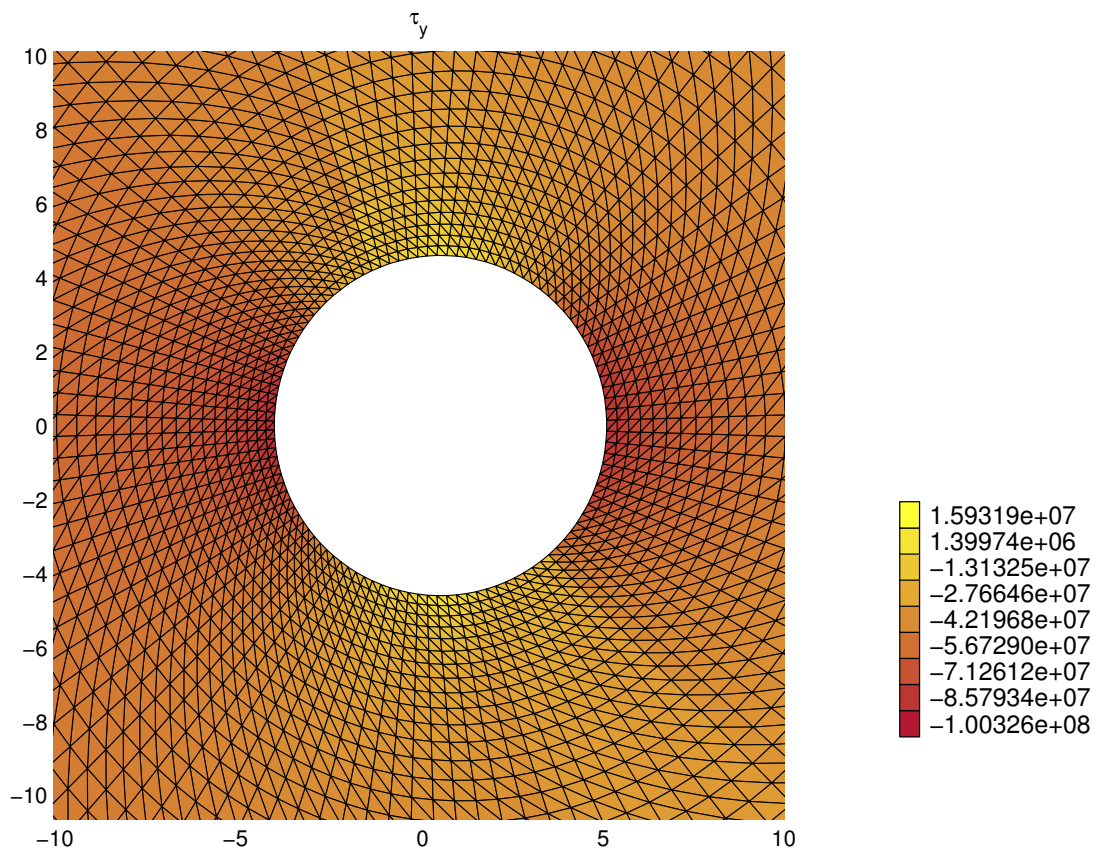


Figure 25: Problem 2 - A detail of stresses τ_y

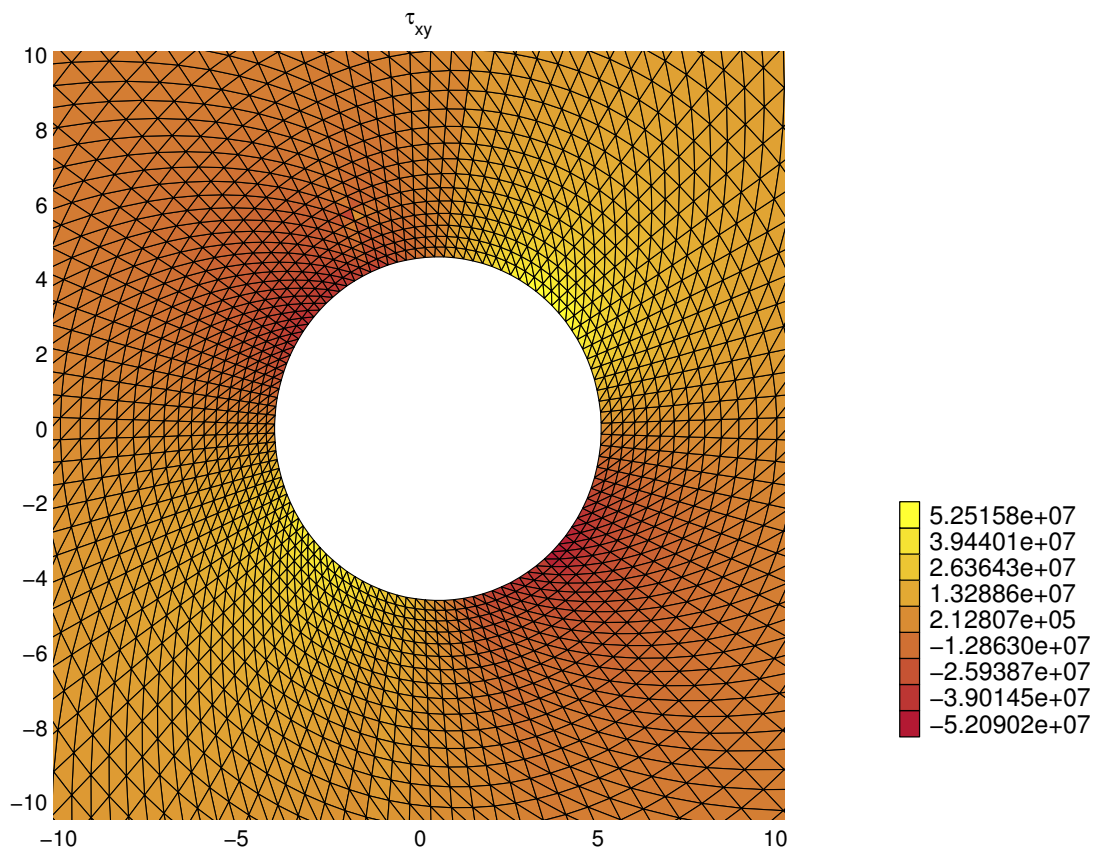


Figure 26: Problem 2 - A detail of stresses τ_{xy}

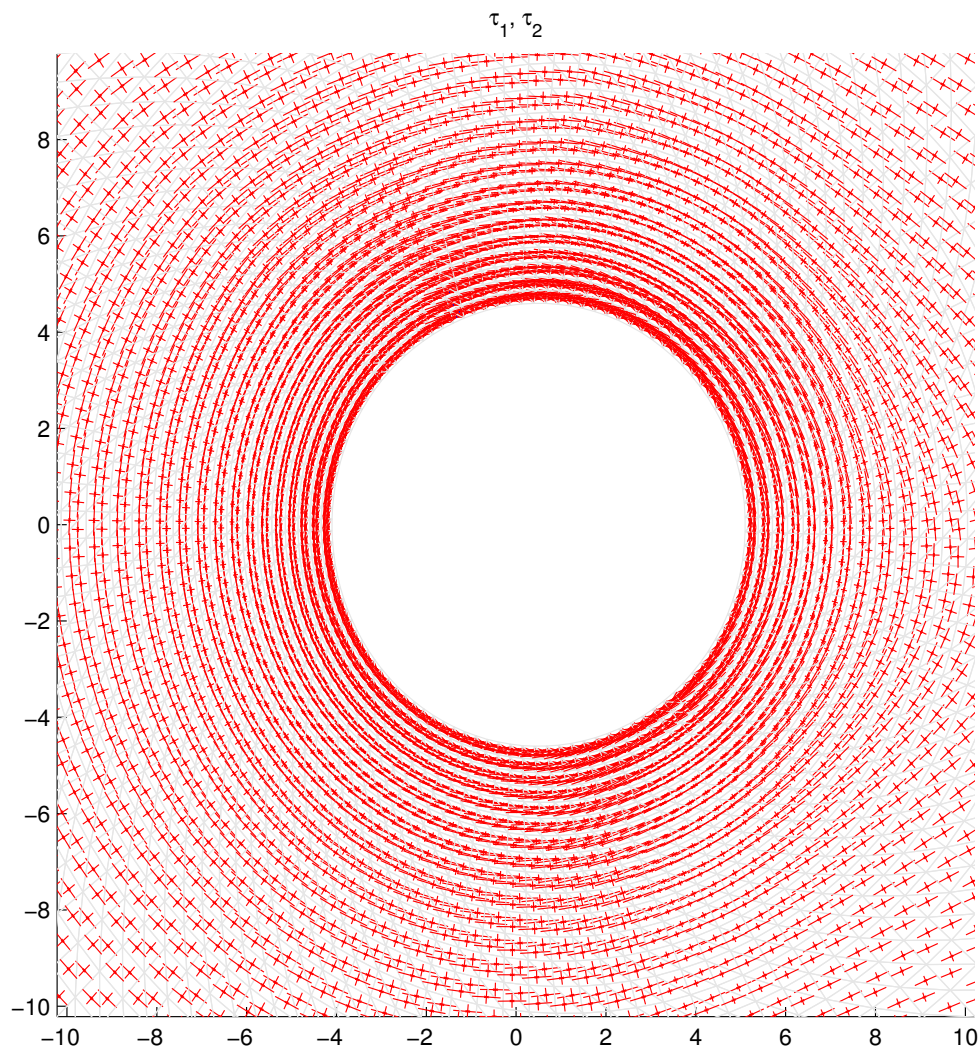


Figure 27: Problem 2 - A detail of principal stresses in neighbourhood of the tunnel.

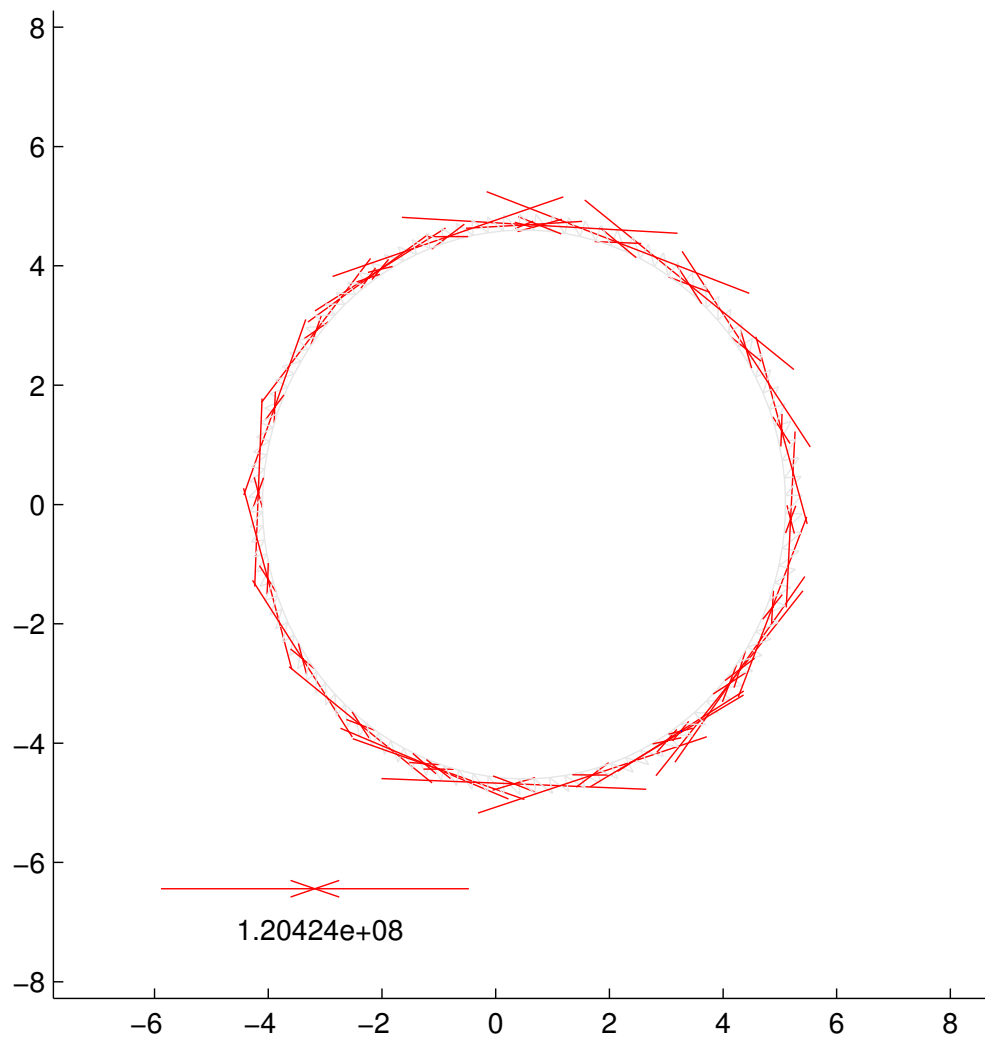


Figure 28: Problem 2 - A detail of principal stresses in neighbourhood of the tunnel.

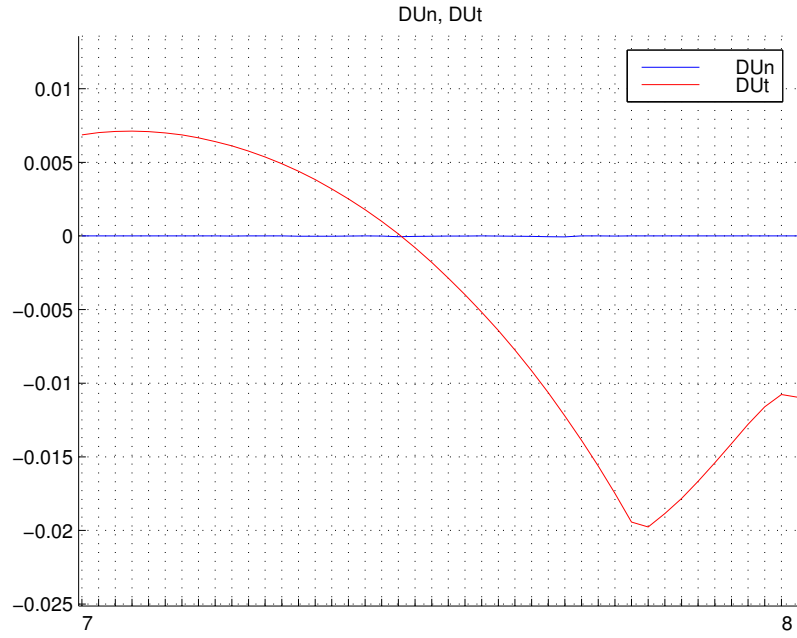


Figure 29: Problem 2 - DU_n , DU_t on contact zone 7-8

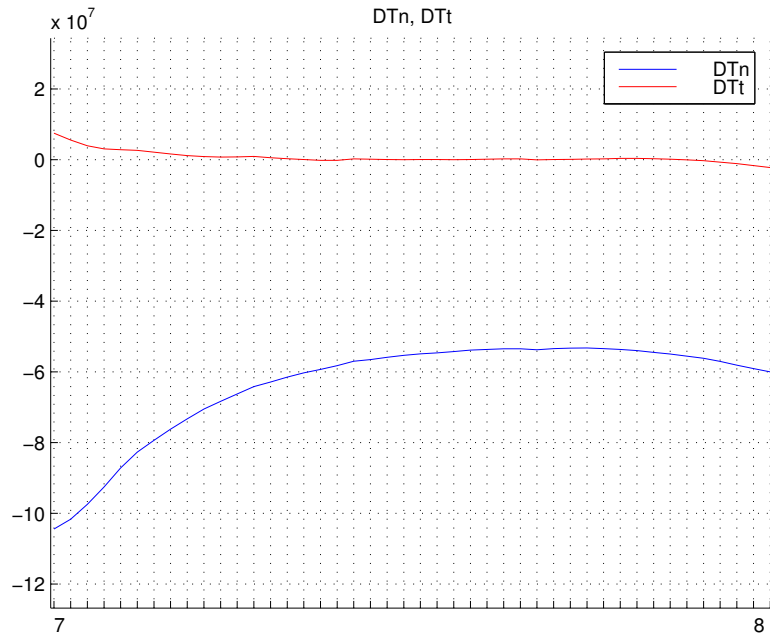


Figure 30: Problem 2 - DT_n , DT_t on contact zone 7-8

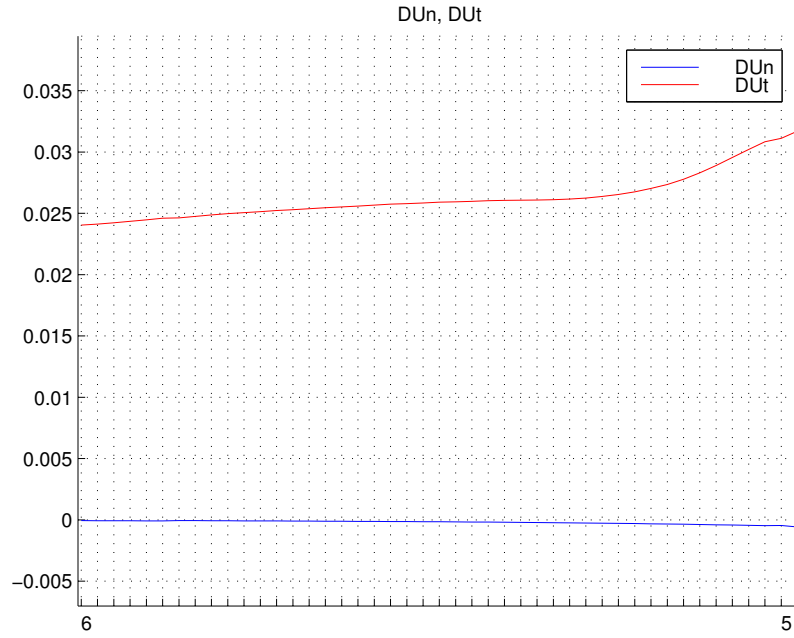


Figure 31: Problem 2 - DU_n , DU_t on contact zone 5-6

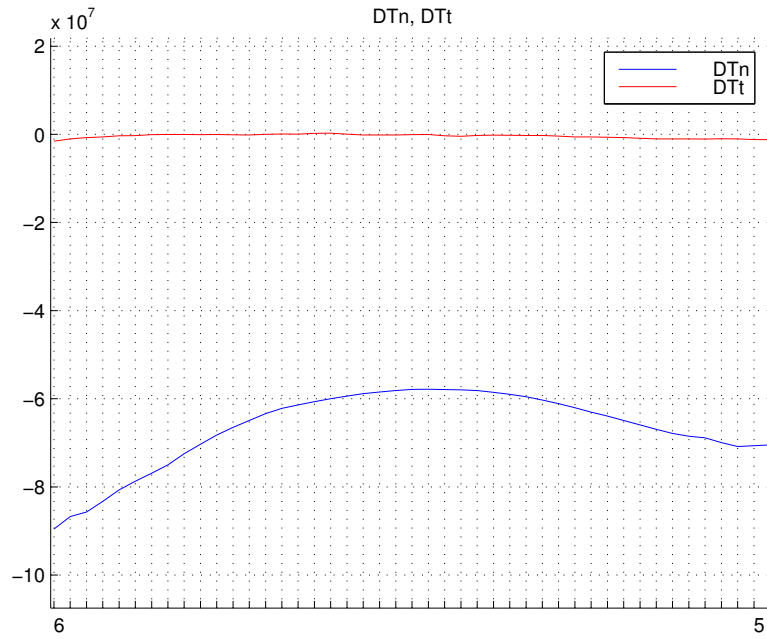


Figure 32: Problem 2 - DT_n , DT_t on contact zone 5-6