Verification - Example 6: Failure of joint above the tunnel

Problem Description

This verification example demonstrates a tunnel with the radius of 2.5m in an infinite domain.

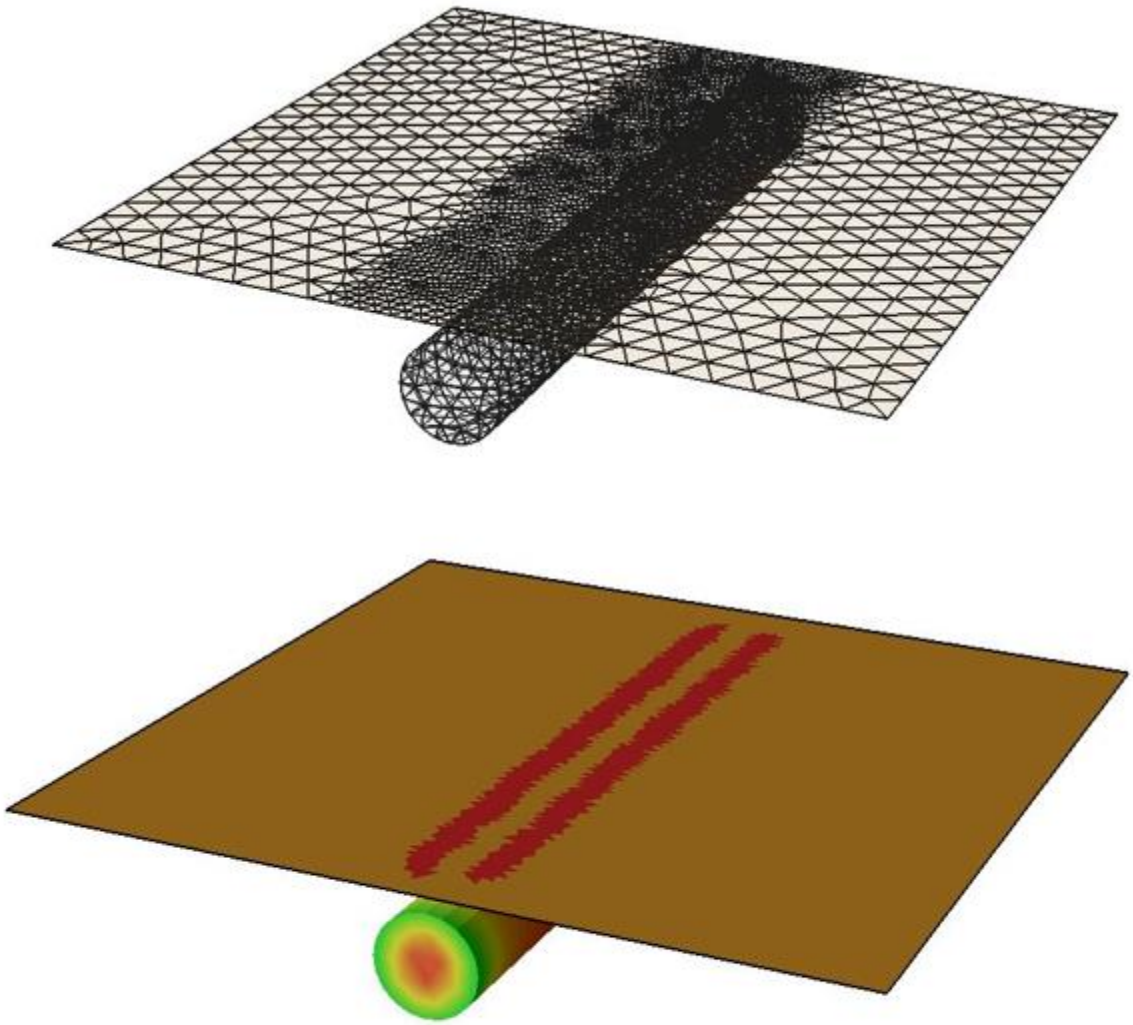
Model Information

Material properties:

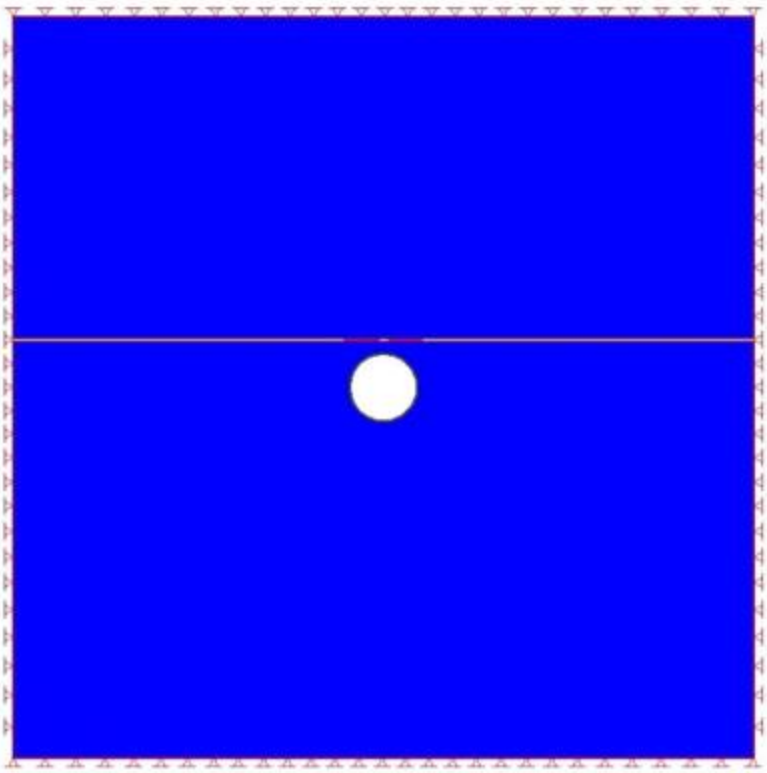
Young’s Modulus	20000 kPa
Poisson’s Ratio	0.25
Tunnel Radius	2.5 m
Field stress	10.0 kPa
Joint normal stiffness	250 MPa/m
Joint shear stiffness	100 MPa/m
Tensile strength	0.0 KPa
Cohesion	0.0 KPa
Frictional angel	20

The joint above the tunnel has a distance of 3.5m from the center of tunnel with the Mohr-Coulomb failure criteria.

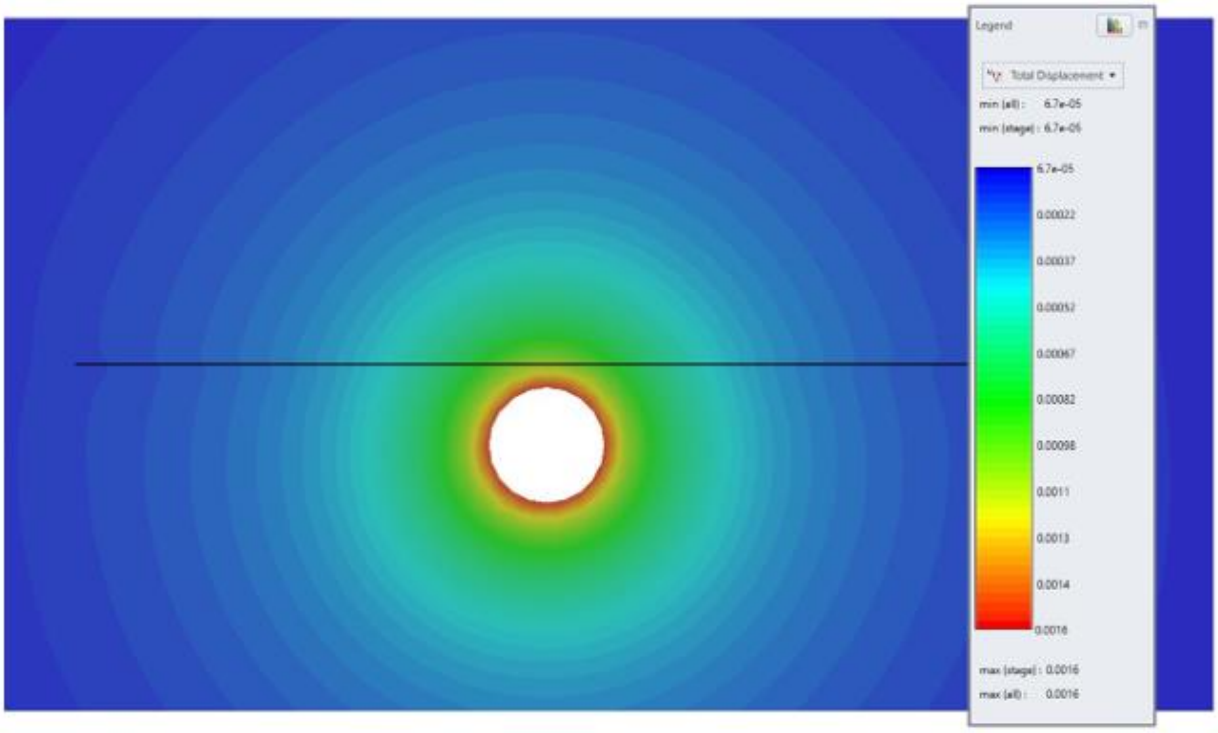
Results



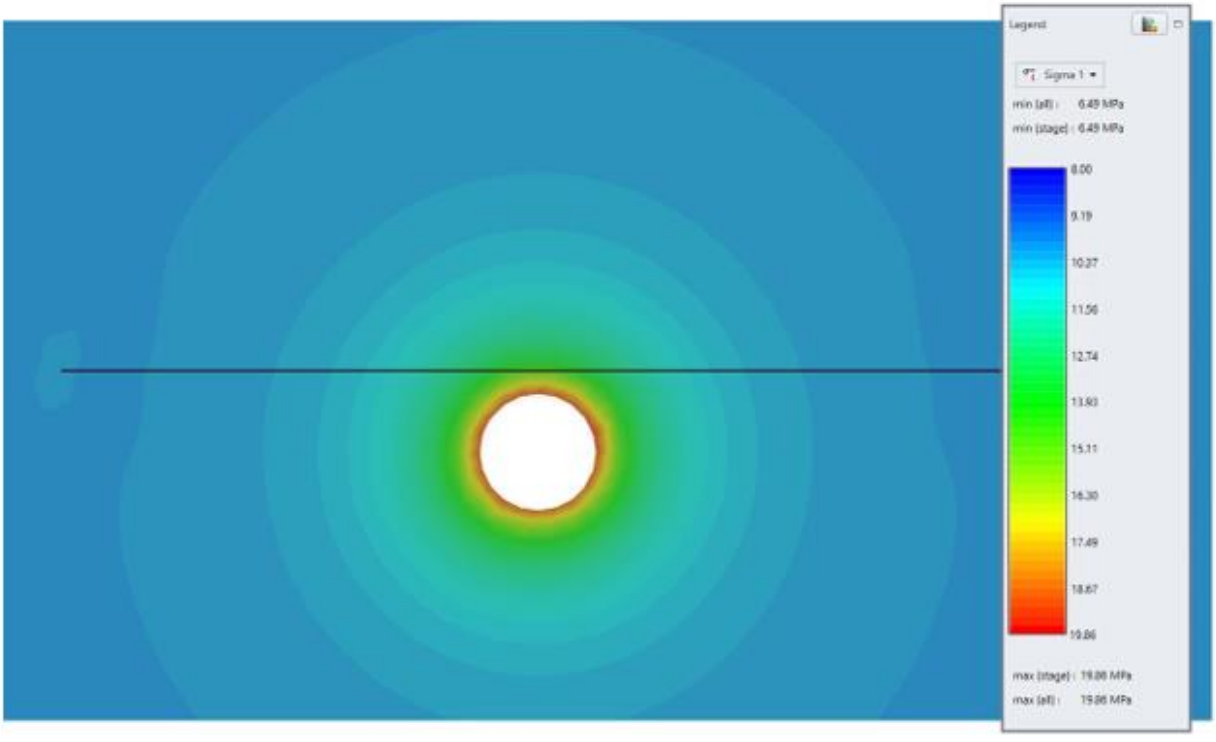
Failed joints in EX3



Failed joint in RS2



Sigma 1



Total Displacement

As expected, most of the joint failure is happening above the tunnel since joints are exposed to more shear stress.

The distribution of joint failure is compared with RS2 (example found RS2 Verification Manual) which shows a good agreement.

Data Files

The data input file(s) and file for the finished model can be found in the EX3 installation folder.