Henrik van Thriel

Assignment 3:

Nonlinearity

caminstech
10-1-2018

1a)

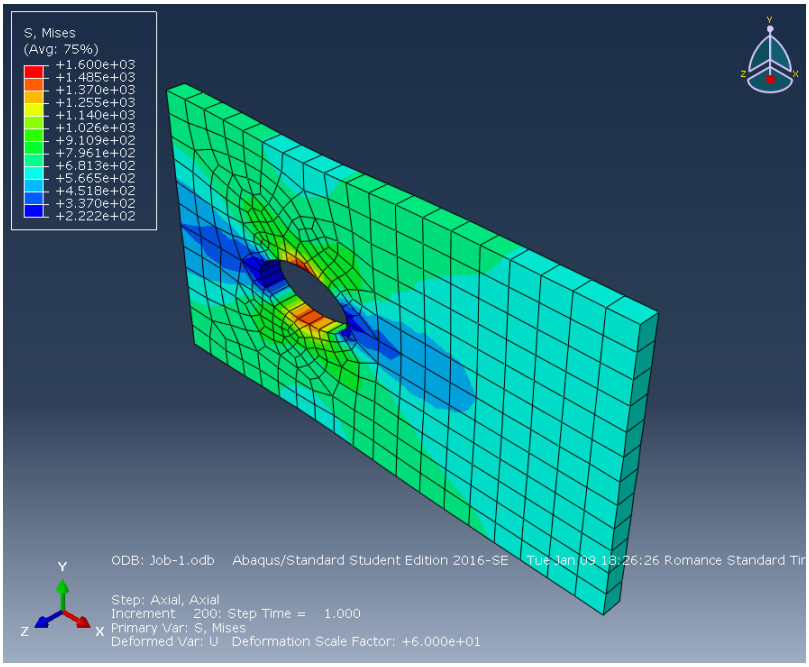


Figure 1:Von Mises Stresses in the plate

The yield limit of 460 MPa is overpassed in the inner regions of the hole in the plate.

1b)

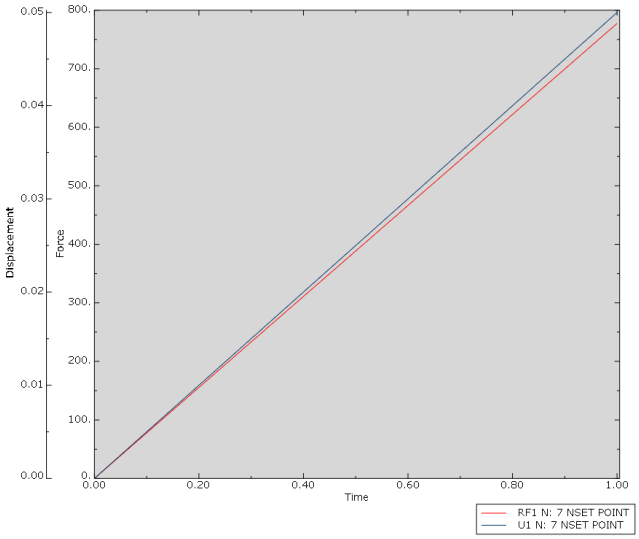


Figure 2: Force-Displacement curve at the point set

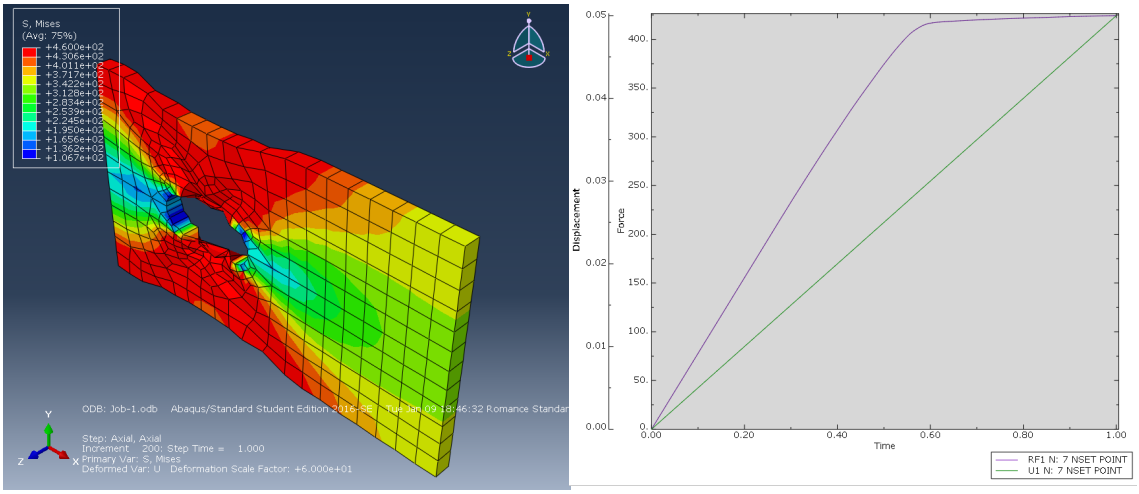


Figure 3: case A)

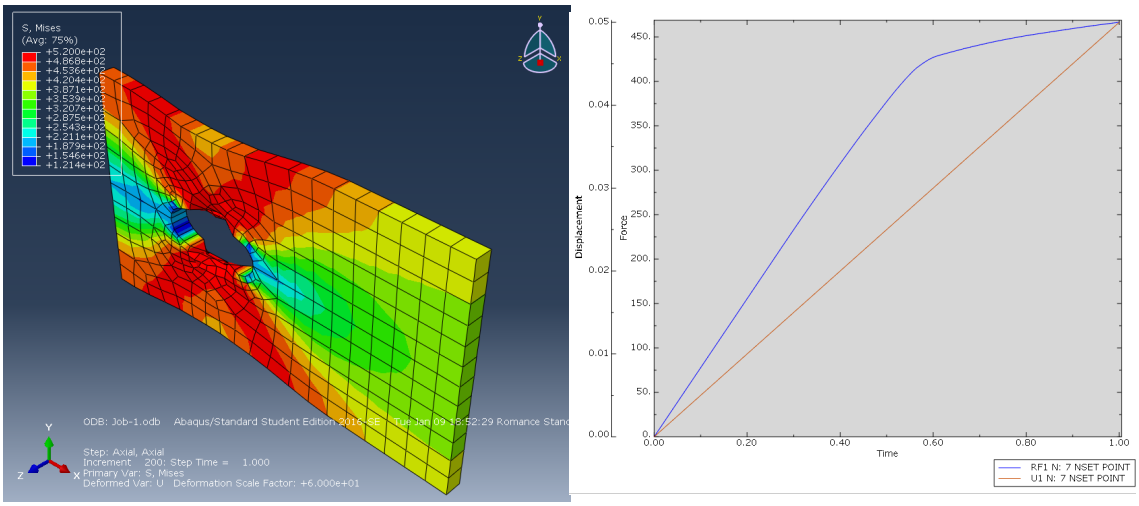


Figure 4: case B)

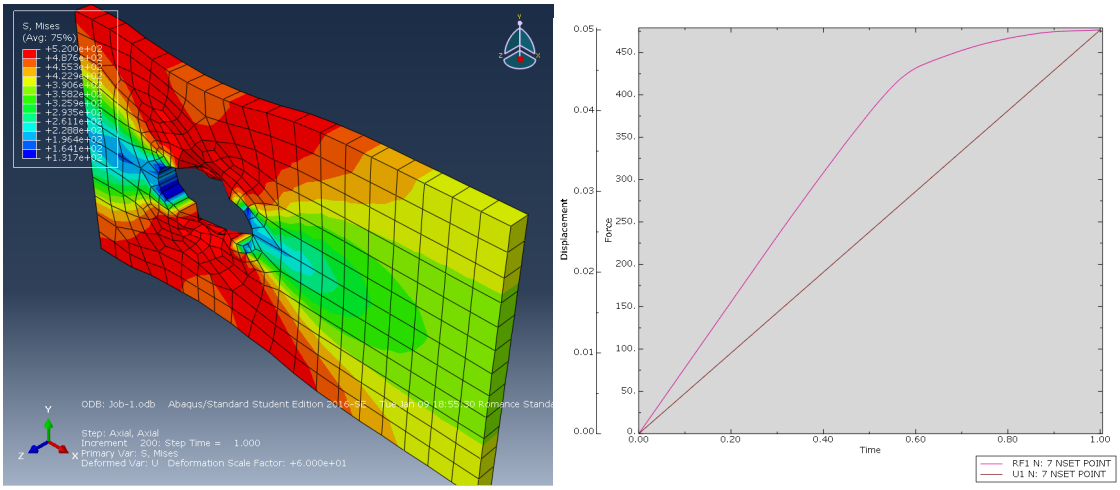


Figure 5: case C)

1.c) Differences in the Force-Displacement

The plasticity increases from case C) to case A). Case A) has perfect plasticity. At a specific point the material becomes plastic properties and there in no more displacement because of “fluid” behavior. When you pull at the plate from both side it will get longer, but with a higher plasticity, the plate cannot endure a specific stress. This means that at one time the behavior of the plate changes and the stress will drop but and there will be a quicker displacement.

In case of B) and C) the material shows plastic and elastic behavior in the last seconds. The plate works a bit more against the displacement but it has in some parts plastic behavior.

2.a)

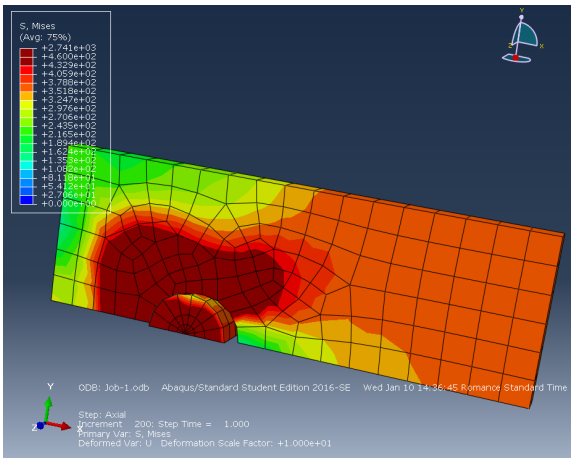


Figure 6. Von Mises Stresses for deformed shape

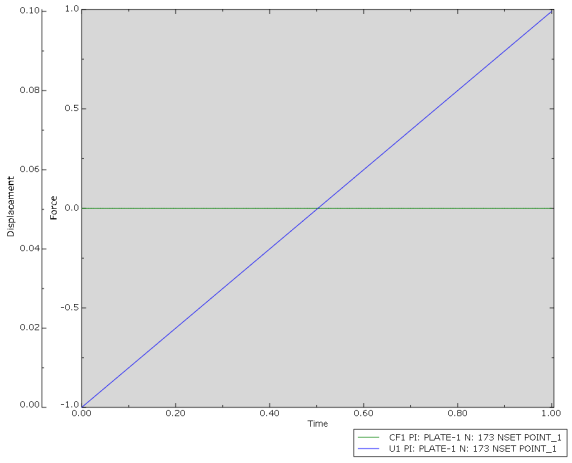


Figure 7: Force3 Displacement for the point set

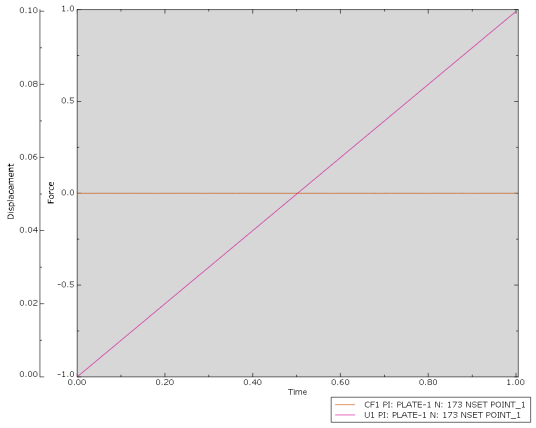


Figure 8: case A)

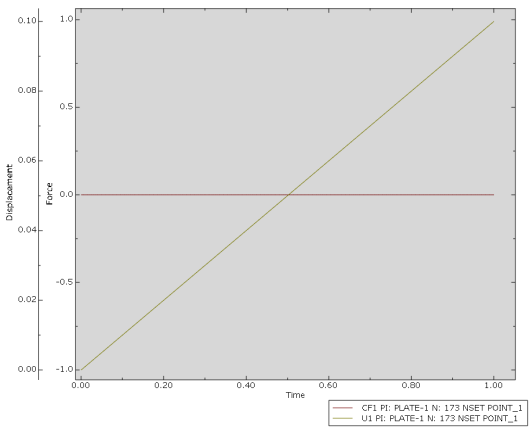
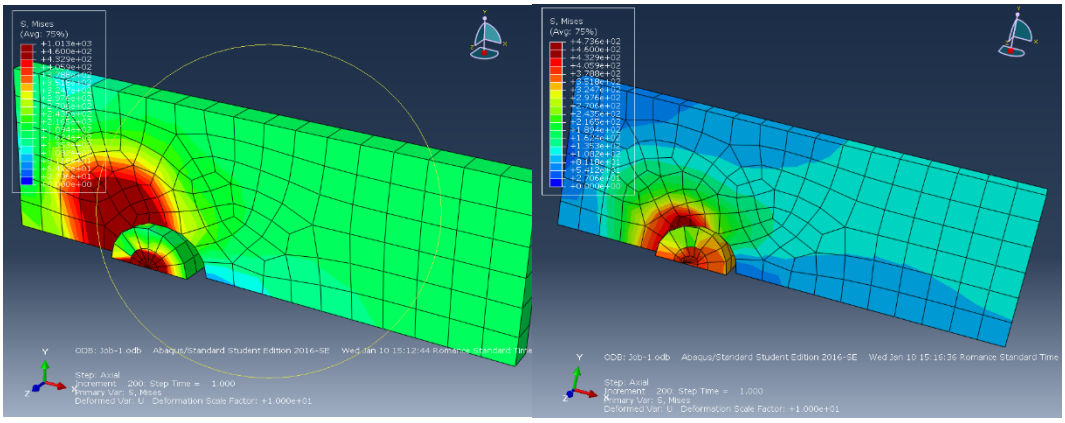


Figure 9: case B)

The horizontal displacement is a constant ramp for both cases. This could also be an error, because the same behavior as in the first part of the task is expected. A constant displacement is caused by elastic material.



The stresses decreas with an increasing plasticity (from A) to B)) because of the same reasons mentioned above. So the plate and the pile are plastic elements and the error must be in the evaluation of the Point displacement. Or for the plastic behavoiur of the material the stresses arent sufficient and there is just elastic behaviour.