ME504 - Computation Mechanics - HW02

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Option 3: Abaqus Equivalent

1 Plate With a Hole

Output figures are all shown at the end of this document.

1.1 Boundary Conditions

- Plane Stress, inforced by defining planes of symmetry in the 'Z' (x3) direction, which is into the page
- Encastre, defined at origin in order to perform static analysis

1.2 Deformation Variation

Yes, the deformation variation looks correct, shown below.

1.3 Radial Stress

No, looks like the wrong boundary condition may have been applied on the bottom of the plate... I think an additional plane of symmetry should have been defined, as the stress is greatest at the center of the arch and least near the unconfined edge, shown below. The mesh also appears to coarse, but I ran out of nodes.

1.4 Tangential Stress

Appears correct on the upper semicircle, but I think a missing boundary condition on the lower edge is missing and providing incorret results.

1.5 Shear Stress

These look reasonable as the... need to review the closed form solution.

2 Hoop and axial stresses in thick-walled pressure vessels

Below is an output image from Abaqus showing the axial stress on an end of the thick-walled pressure vessel. Original mesh dimensions outlined in black and deformed mesh colored with respect to the magnitude of axial stress.

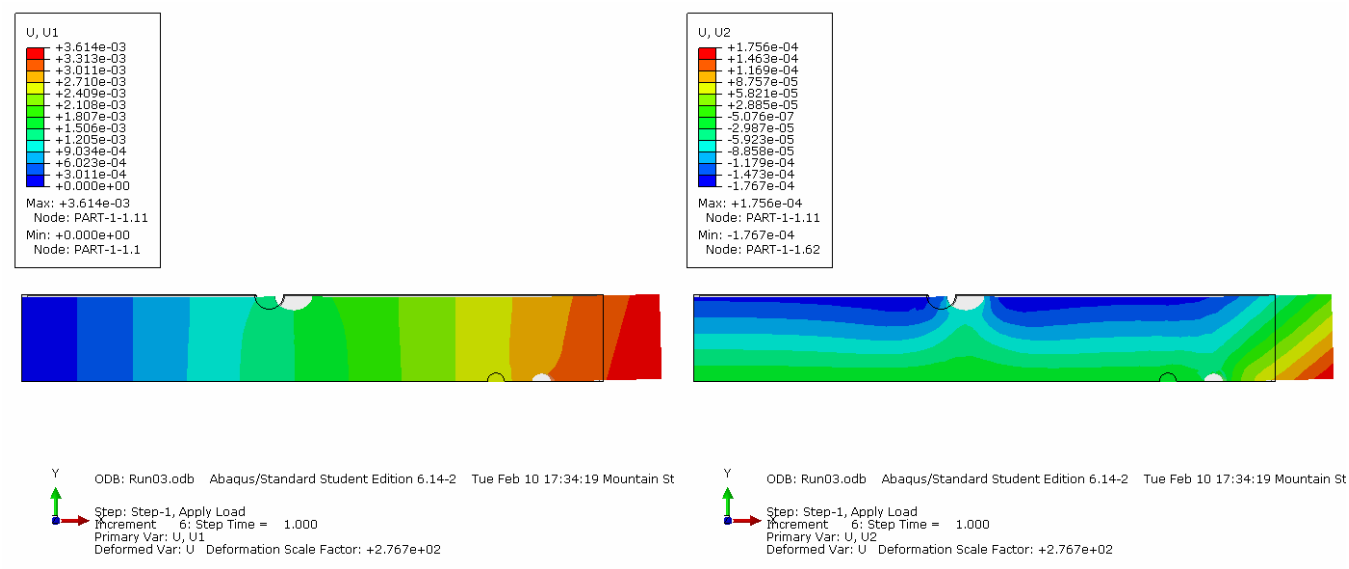

Figure 1: Horizontal (U1) and Lateral (U2) Displacements of the Plate.

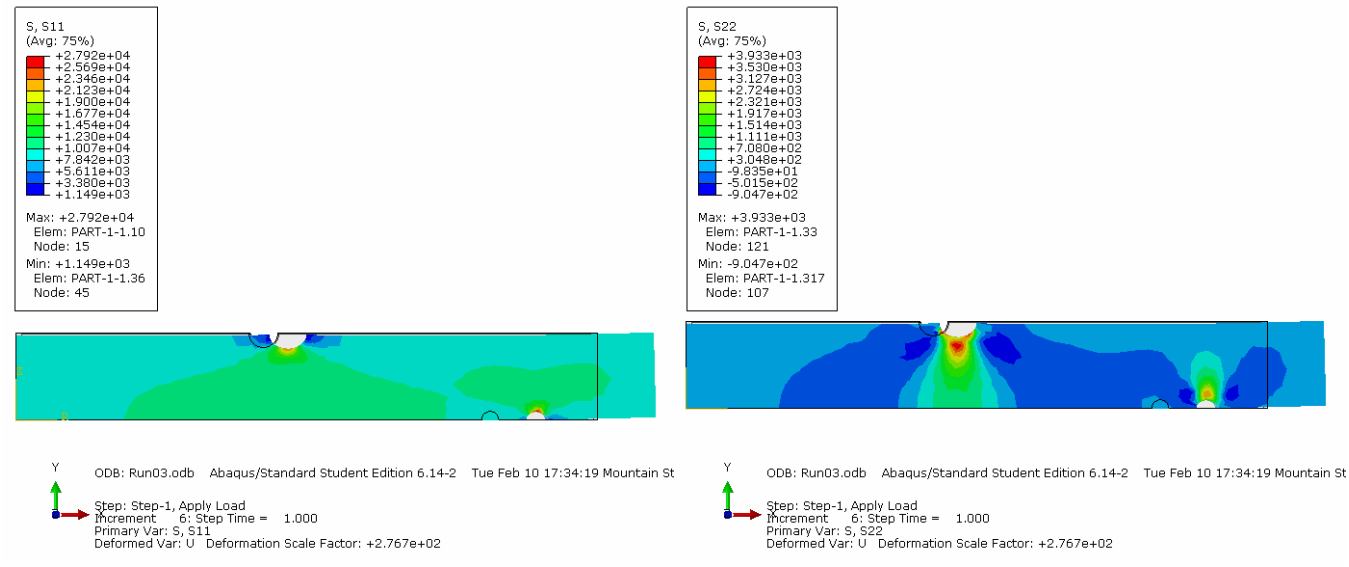

Figure 2: Radial (S22) and Tangential (S11) Stresses On the Plate.

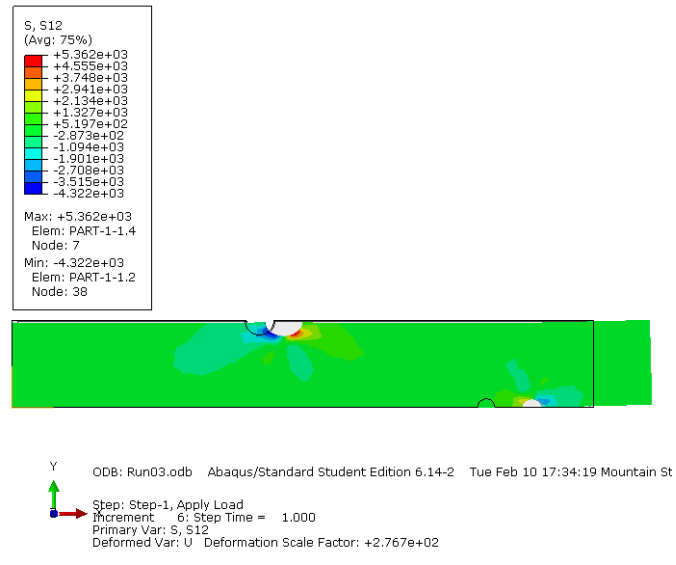

Figure 3: Shear Stress on Plate.

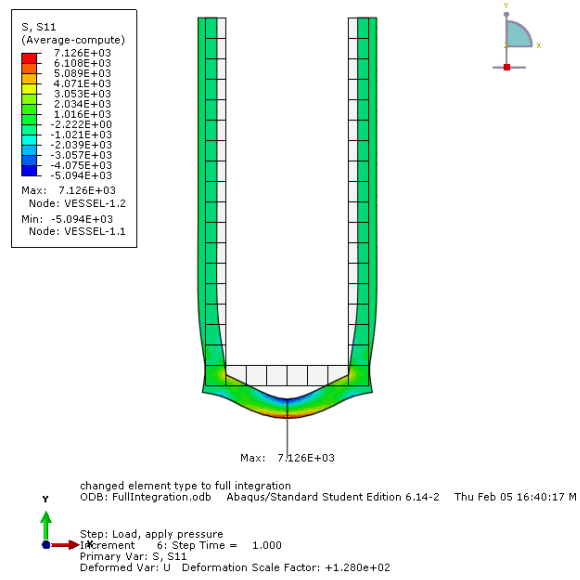

Figure 4: Axial Stress On Cross Section of Thick-Walled Pressure Vessel (Abaqus).