1 PLATE WITH HOLE – 2D STUDY

1. *Based on descriptions* given by clicking on each 2D study type (Plane Stress, Plane Strain, Axi-symmetric), which study type would be used for each of the following scenarios:

    a. We are calculating the stresses in a scuba diving air tank
    - Axi-symmetric
    b. We are calculating the stresses in the cross-section of a long dam, away from the ends
    - Plane Strain
    c. We are calculating the stresses in a perforated sheet metal strap under tension
    Plane Stress

2. Fill out the following table for our three runs with standard meshes. Use the Matlab script to get the calculated value (same for all rows):

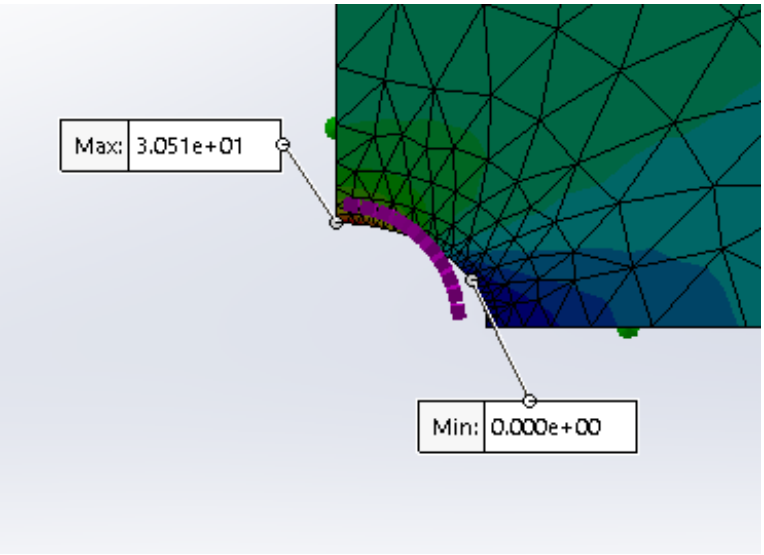
Mesh Type	No. of DOF	Max 1st Principal Stress (ksi)	Calculated Max Stress (ksi)	%Difference
Coarse	1422	23.83	30.35	21.5
Med	4308	30.92	"	1.86
Fine	19992	30.81	"	1.50

3. Fill out the following table for out coarse mesh with mesh control:

Mesh type	No. of DOF	Max 1st Principal Stress (ksi)	Calculated Max Stress (ksi)	%Difference
Coarse w/ control	2230	30.51	"	0.51

4. From the results shown above, why might we want to use mesh control rather than simply refining the mesh for the whole model?
    You would want to use a control mesh if you are more interested in a specific area so it can give you greater accuracy and it can save on computing time.

5. For the last run above, zoom in on the edge of the hole in the 1st Principal Stress plot with the visible mesh and create a screenshot – paste it here.



2 PLATE WITH HOLE – 3D STUDY

6. Why are the constraints applied in the 2D simplification not sufficient in the 3D case? What else do we need?
   - You need an additional constraint for the degree of freedom that was added in 3D.

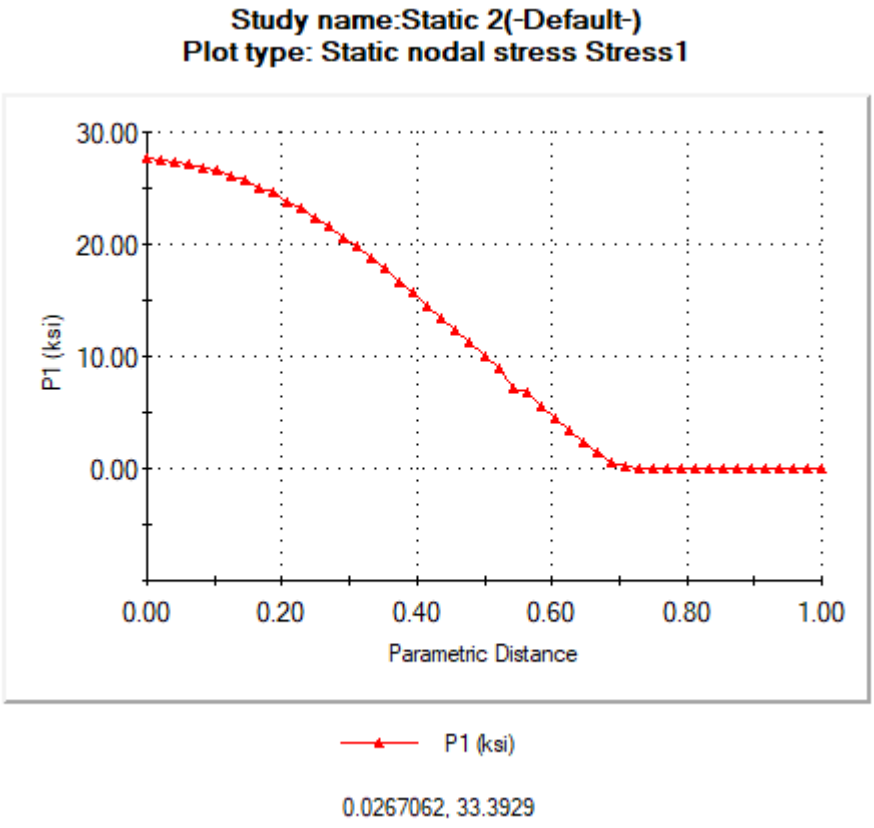
7. Fill in the Chart (calculated max stress is the same as in 2D):

Mesh Type	No. of DOF	Max 1st Principal Stress (ksi)	Calculated Max Stress (ksi)	%Difference
Coarse	8967	25.62	30.35	15.6
Med	42183	32.25	"	6.25
Fine	228996	31.14	"	2.59

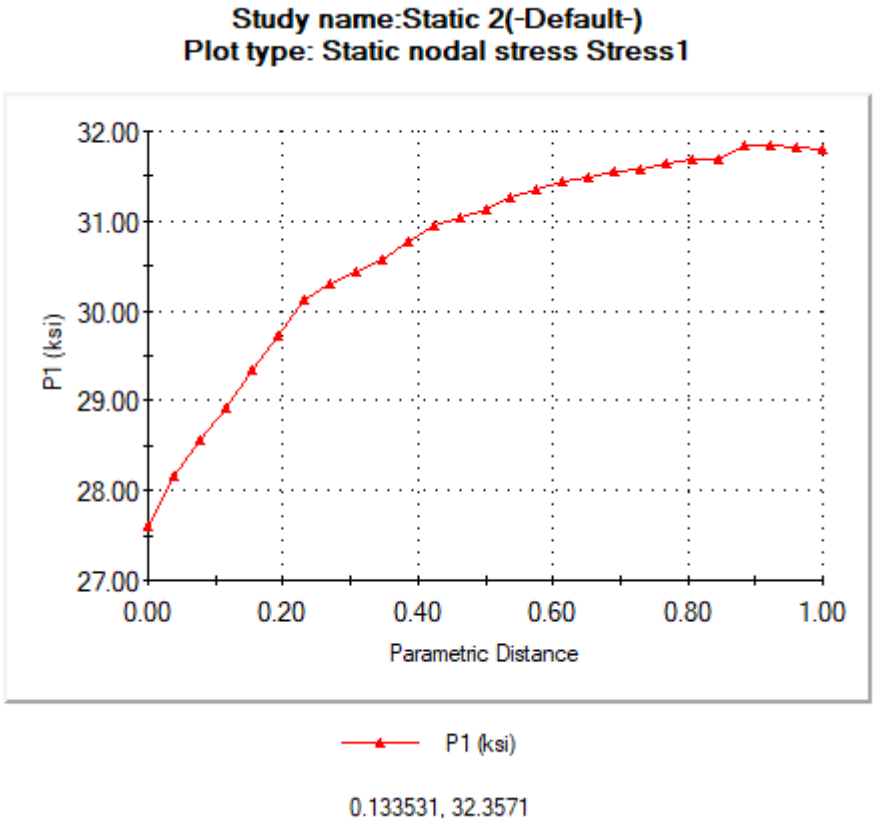
8. Fill out the table below for the mesh-control run:

Mesh type	No. of DOF	Max 1st Principal Stress (ksi)	Calculated Max Stress (ksi)	%Difference
Coarse w/ control	23937	31.85	"	4.93

9. Insert your plot of 1st Principal Stress along the Circular hole edge.



10. Insert your plot of 1st Principal Stress along the straight edge (where stress is maximum).


Study name:Static 2(-Default-)
Plot type: Static nodal stress Stress1
32.00
31.00
30.00
29.00
28.00
27.00
P1 (ksi)
0.00
0.20
0.40
0.60
0.80
1.00
Parametric Distance
P1 (ksi)
0.133531, 32.3571