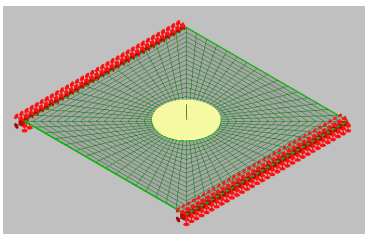


Spider Beams, Bar  $0.20 \times 0.20 \text{ in}^2$   
 Espider =  $29e6 \times 1000 = 29e9$



NASTRAN RBE2 Element  
 Center Pull

Mecway

File Edit View Mesh tools Solution Tools Help

Configuration

- Analysis <Static 3D>
- Geometry
- Components & Materials
- Default <992 el>
- Material
- Loads & Constraint
  - fixed support
  - force <100 lbf>
- Named Selections
- Solution
  - Components
  - von Mises stress
    - bottom
    - midplane
    - top
  - displacement
    - magnitude
    - X
    - Y
    - Z
  - rotation
  - reaction force
  - reaction moment

displacement magnitude

0.03039  
0.02887  
0.02735  
0.02583  
0.02431  
0.02279  
0.02127  
0.01975  
0.01823  
0.01671  
0.01519  
0.01368  
0.01216  
0.01064  
0.009117  
0.007597  
0.006078  
0.004558  
0.003039  
0.001519  
0  
in

Deformation scale factor 500

Elements: 992 Nodes: 1080 Selected nodes:

**RBE3 COMPARISON**  
 --Displacements vary (weighted)  
 --Force distributes equally

von Mises stress

1.25E+04  
1.194E+04  
1.138E+04  
1.082E+04  
1.026E+04  
9694  
9133  
8571  
8010  
7449  
6888  
6327  
5765  
5204  
4643  
4082  
3521  
2959  
2398  
1837  
1276  
lbf/in<sup>2</sup>

12136.  
11467.  
10798.  
10130.  
9461.  
8792.  
8123.  
7455.  
6786.

Femap with NX Nastran

Connect Model Mesh Modify List Delete Group View Window Help

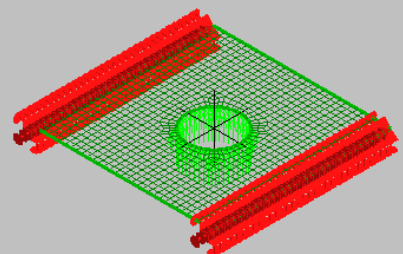
BE2 TestCCX.inp : Untitl. Frustrated.modfem : U...

0.0304  
0.0285  
0.0266  
0.0247  
0.0228  
0.0209  
0.019  
0.0171  
0.0152  
0.0133  
0.0114  
0.0095  
0.0076  
0.0057  
0.0038  
0.0019  
0.

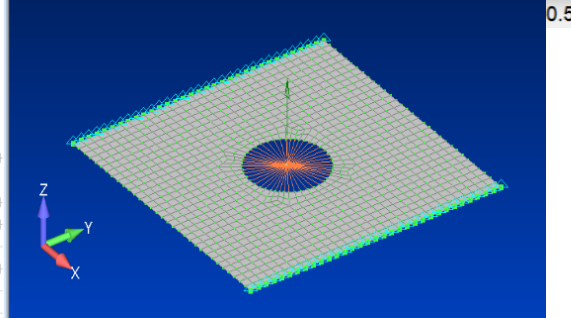
Output Set: NX NASTRAN Case 1  
Deformed(0.0304): Total Translation  
Nodal Contour: Total Translation

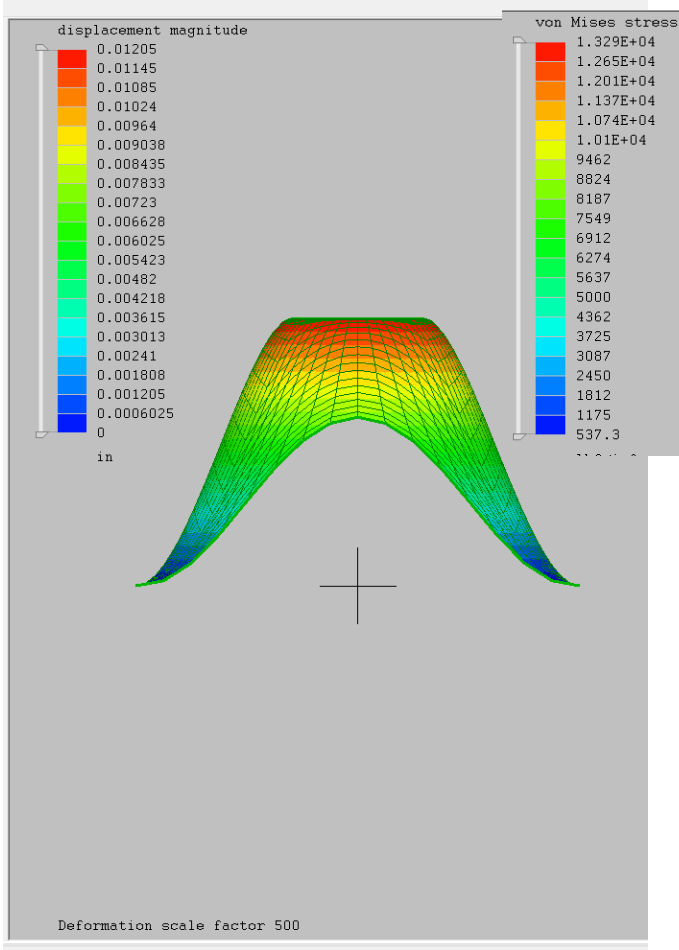
Ready - Nodes: 1082, Elements: 994 Prop: 0 Ld: 4 Con: 1 Grp: 0 Out: 15

Force applied to hole perim. faces

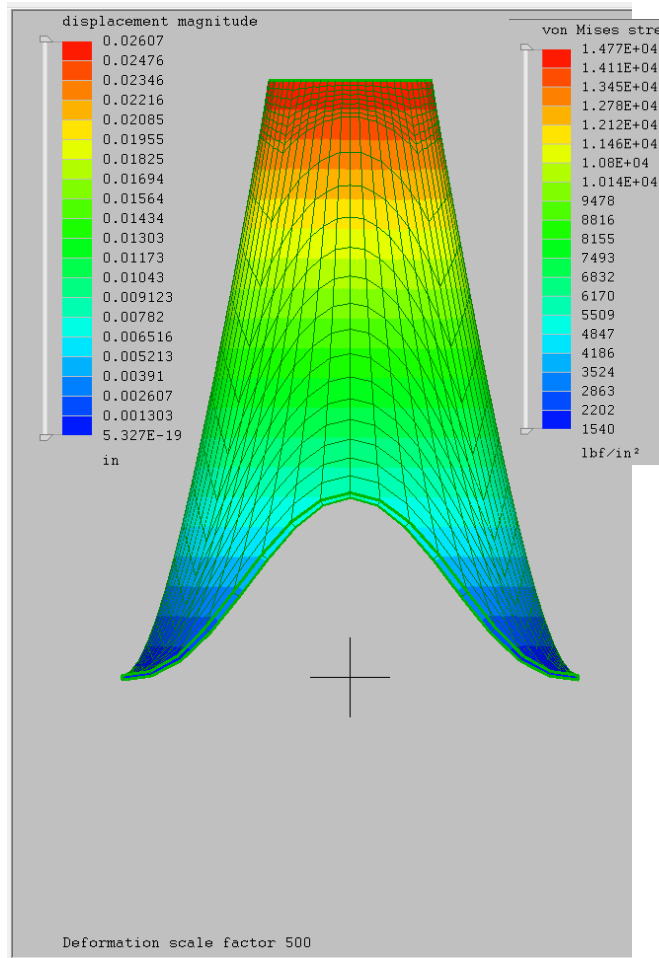


NASTRAN RBE3 Element Center Pull

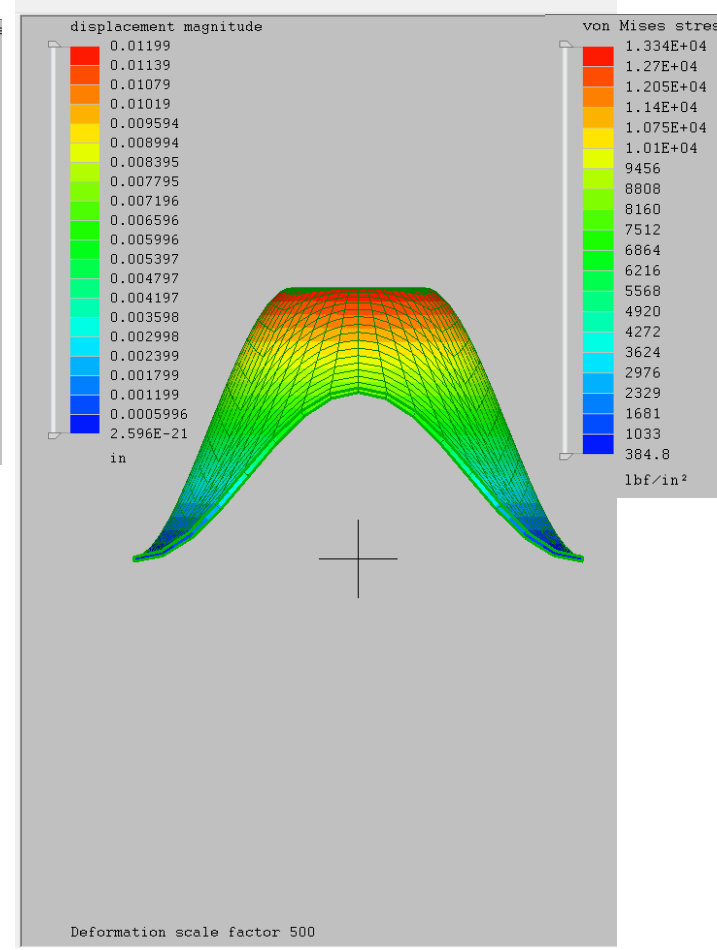




Mock RBE2. Displaced the hole edges uniformly until Base z-axis  
 Sum Reaction = 100 lbs  
 Rotation Constraints added on hole edge (x & y axis rot. = 0).



The CCX Node-Surface Coupling.  
 Somewhere in between...



CCX Node-Surface Coupling with  
 Rotation Constraints added on hole edge (x & y axis rot. = 0).

The TAKEAWAY: Using hyper-stiff SPIDER Beams (Dandelions?) has promise as an alternative to RBE2 Rigid Elements. More investigation needed with other model scenarios.