

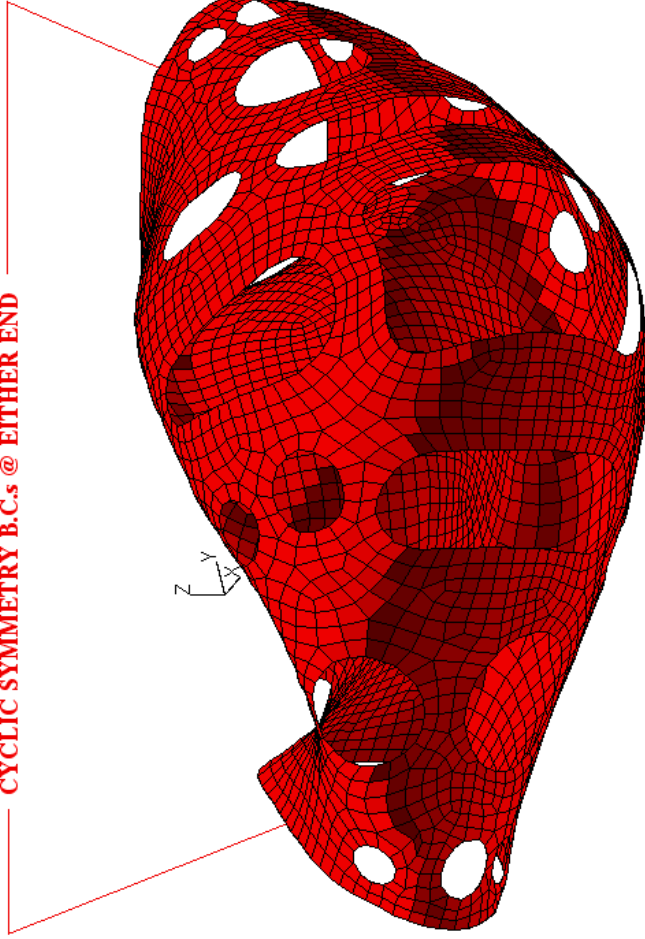
**NCSX First Wall FEA**  
**Stationary Disruption Analysis**

**NCSX ENGR. MTG.**

**13 March 2002**

**F. Dahlgren**

CYCLIC SYMMETRY B.C.s @ EITHER END

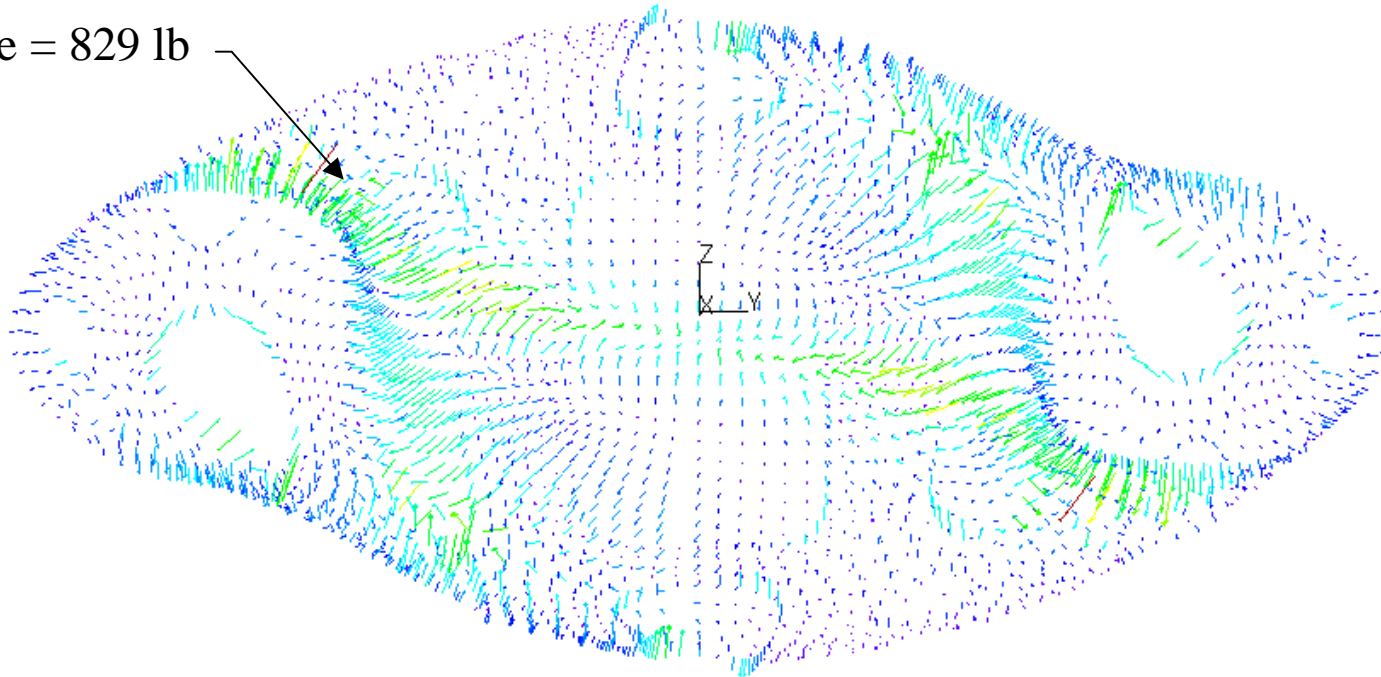


**NCSX - FIRST WALL FEA MODEL**

# Forces on Grid Points

## NCSX - 1st Wall FEA Model

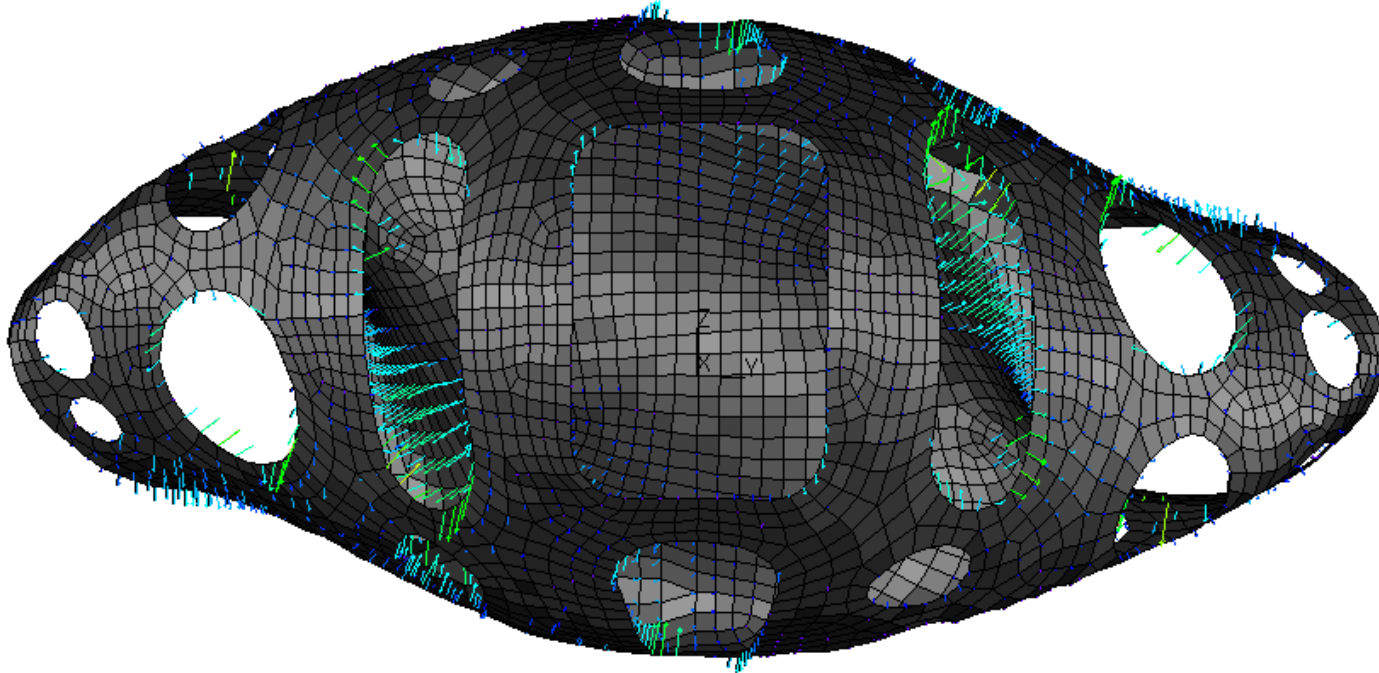
Peak Force = 829 lb



175 kA Stationary Disruption - Self-Force + Coil-Force

# Forces on Grid Points

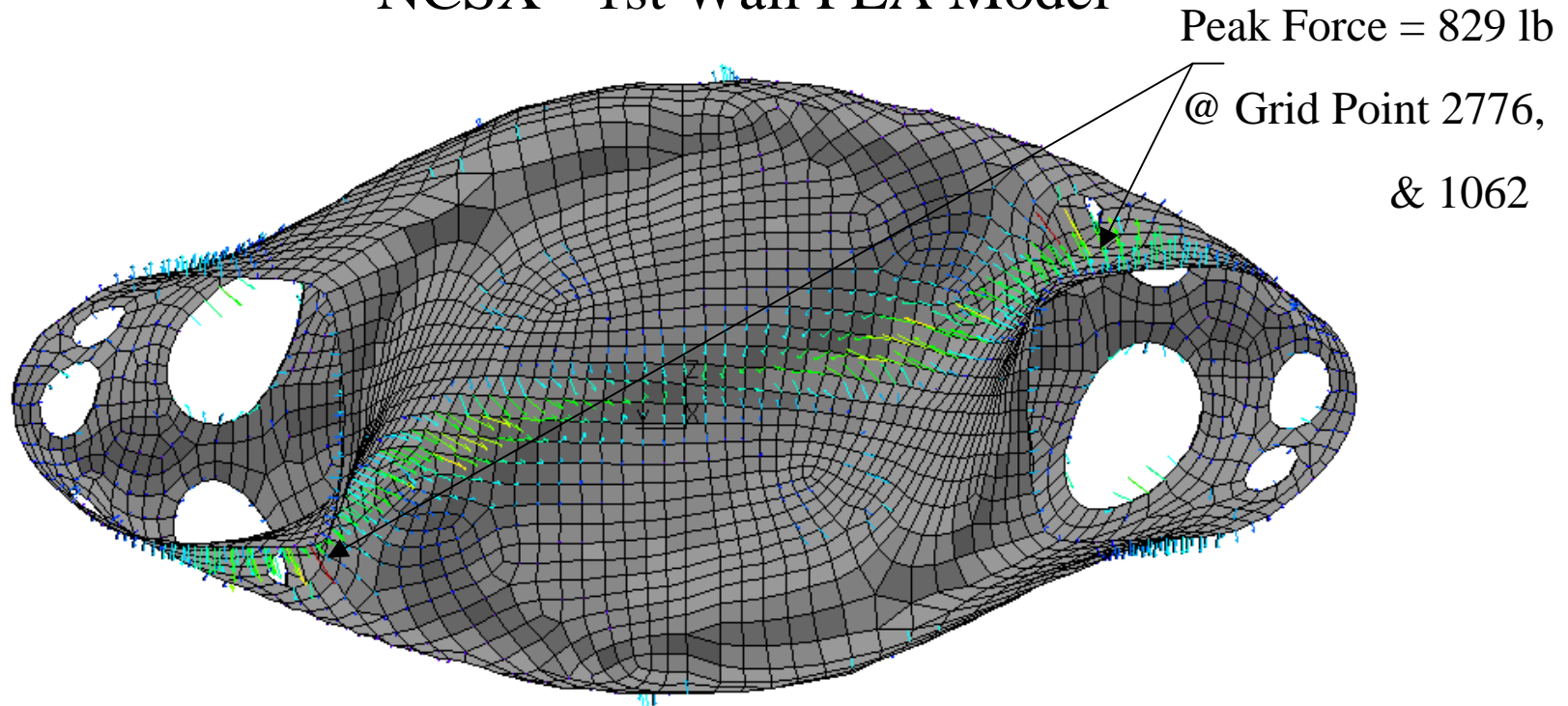
## NCSX - 1st Wall FEA Model



175 kA Stationary Disruption - Self-Force + Coil-Force

# Forces on Grid Points

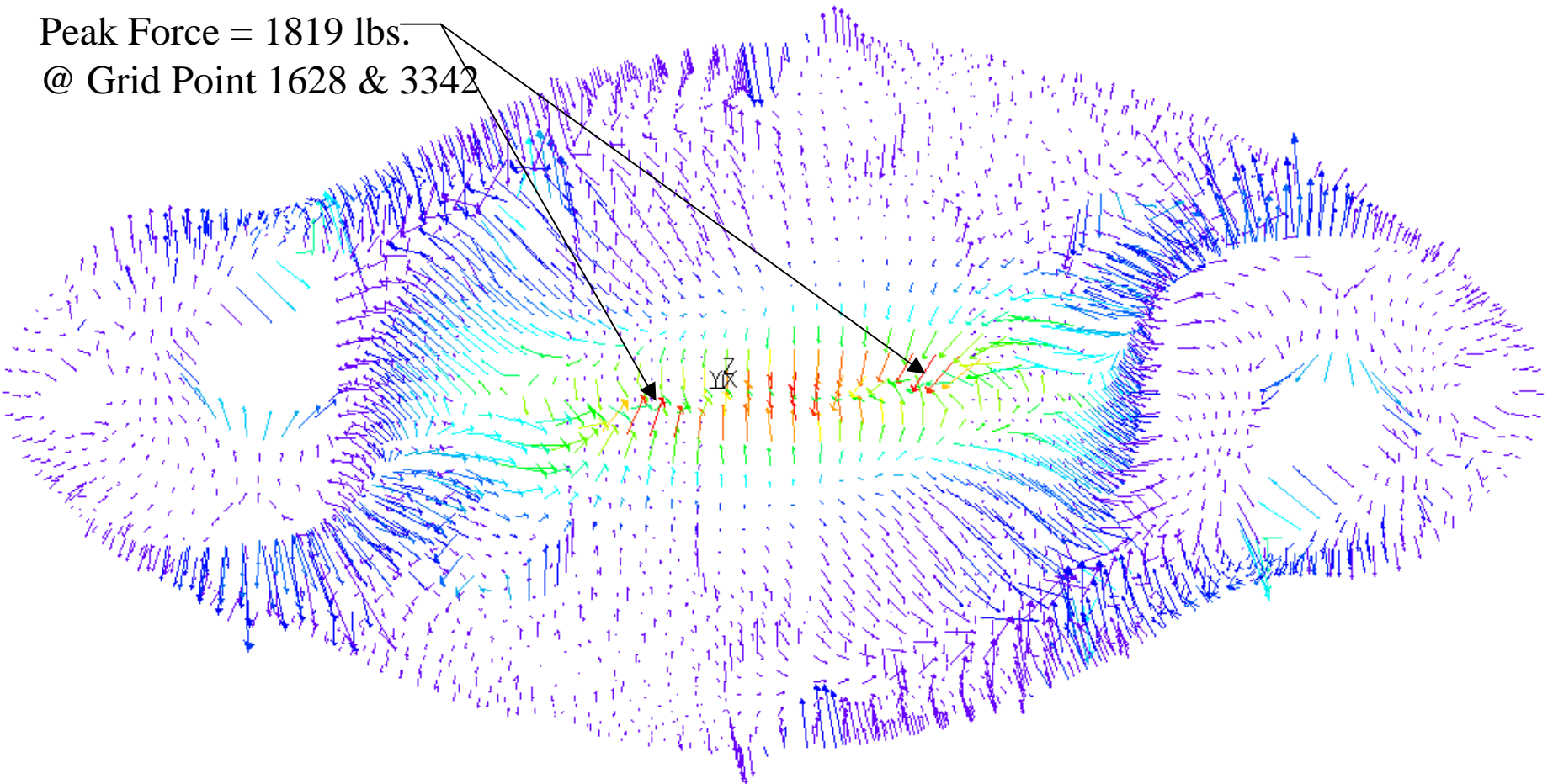
## NCSX - 1st Wall FEA Model



175 kA Stationary Disruption - Self-Force + Coil-Force

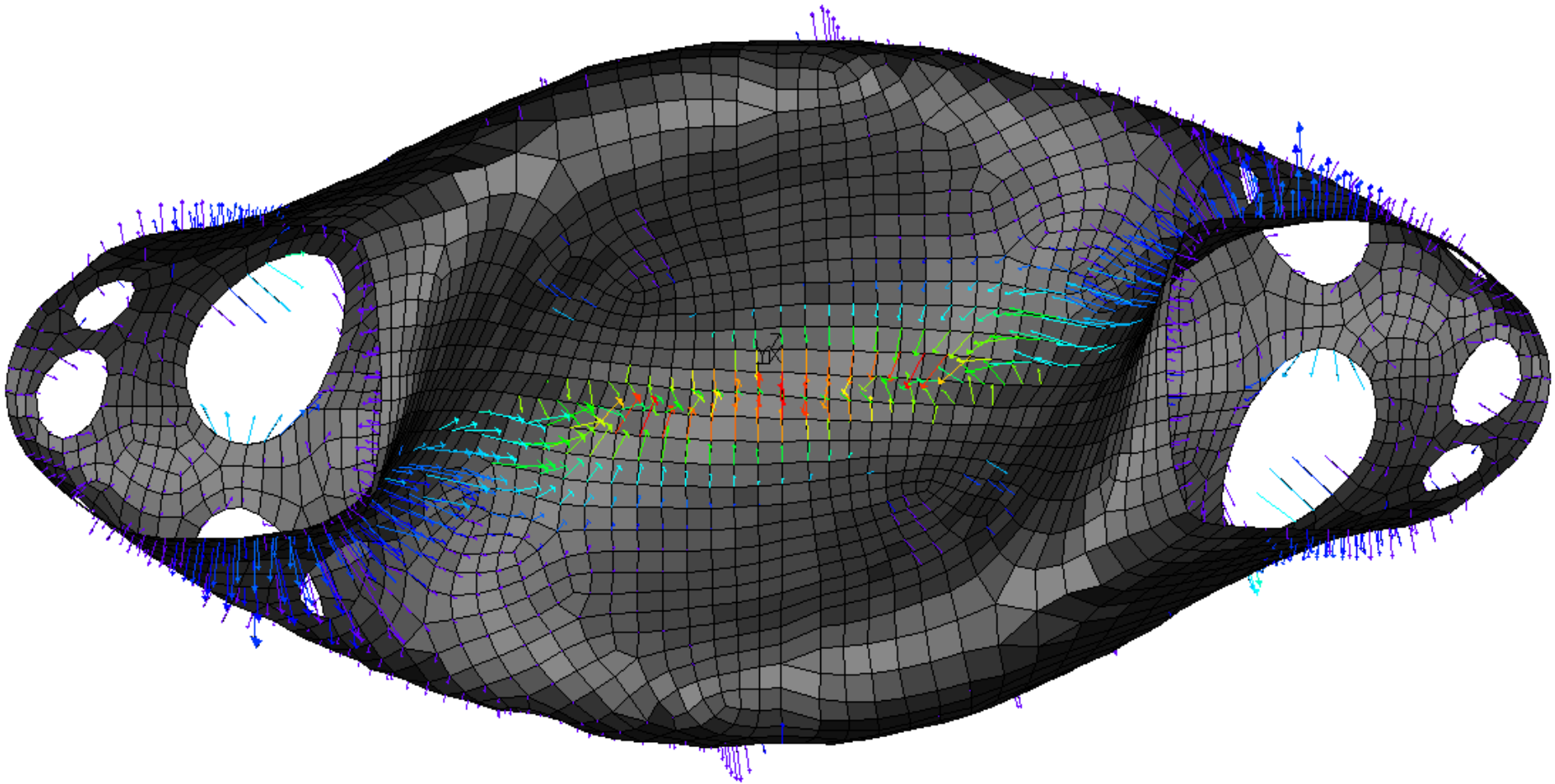
# NCSX - 1st Wall FEA Model

Peak Force = 1819 lbs.  
@ Grid Point 1628 & 3342



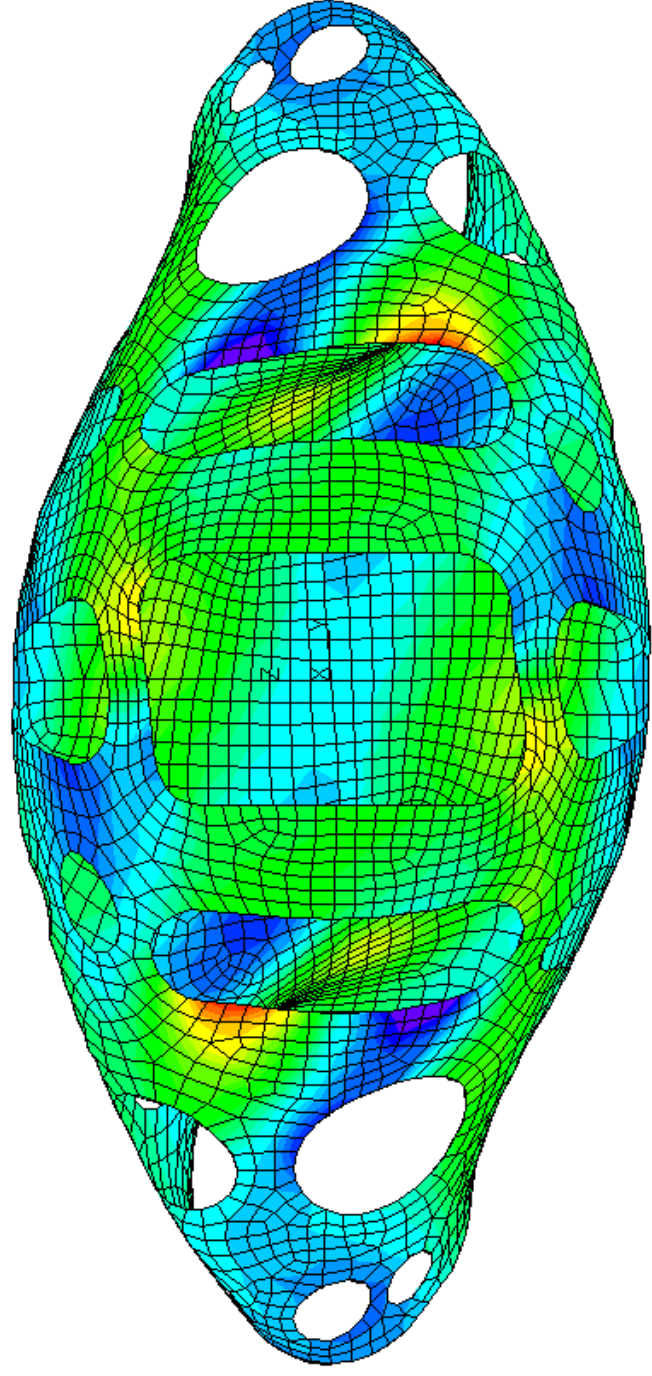
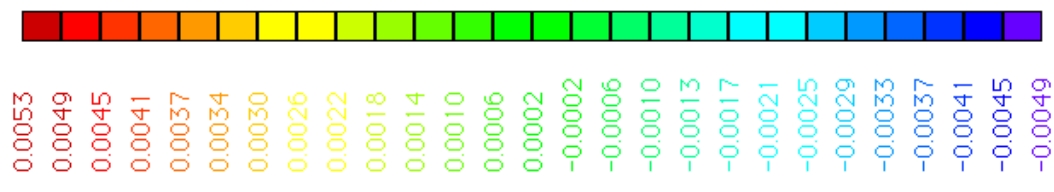
350 kA Stationary Disruption - Self-Force + Coil-Force

# NCSX - 1st Wall FEA Model



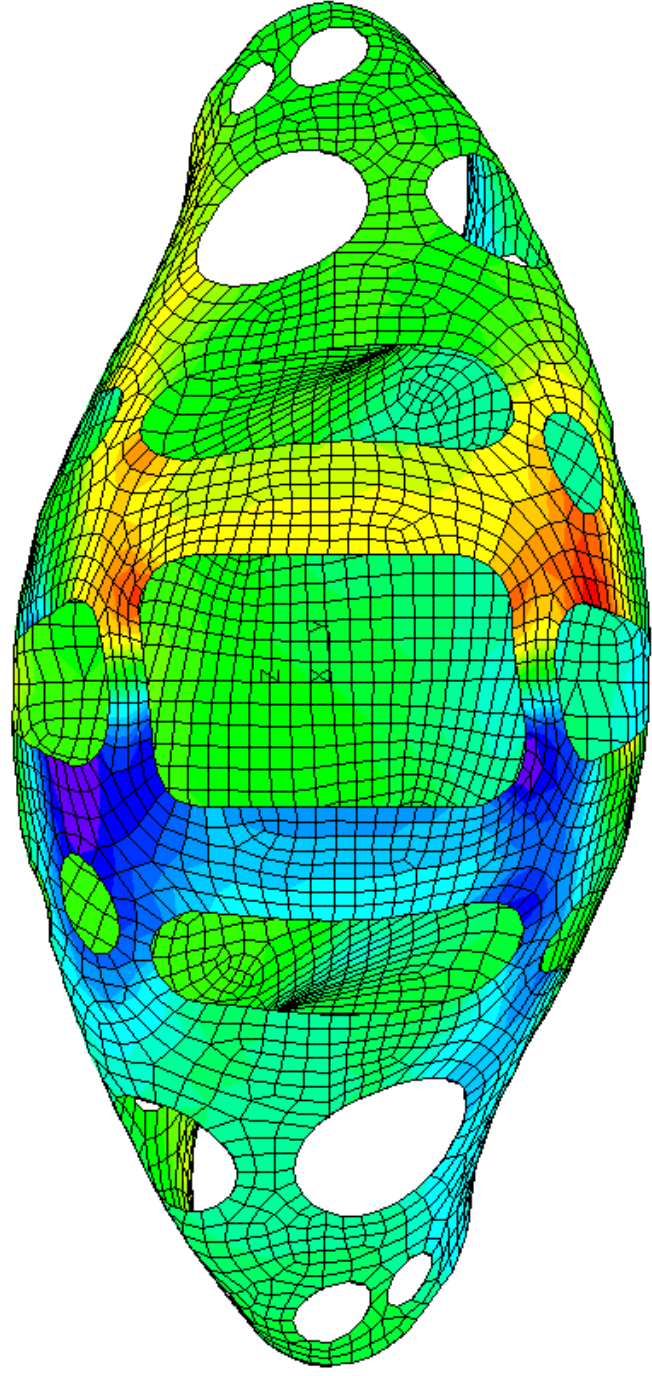
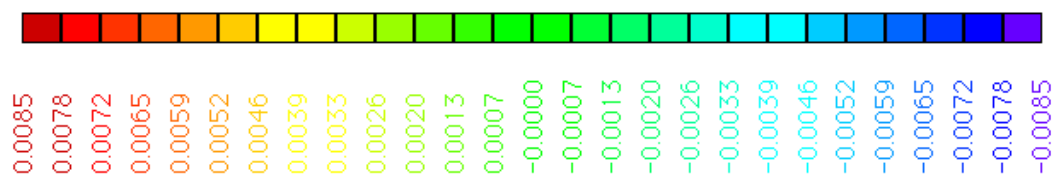
350 kA Stationary Disruption - Self-Force + Coil-Force

Displacements  
X-displ. (Inches)  
Max X-displ:0.0053





Displacements  
Z-displ. (Inches)  
Max Z-displ. 0.0085

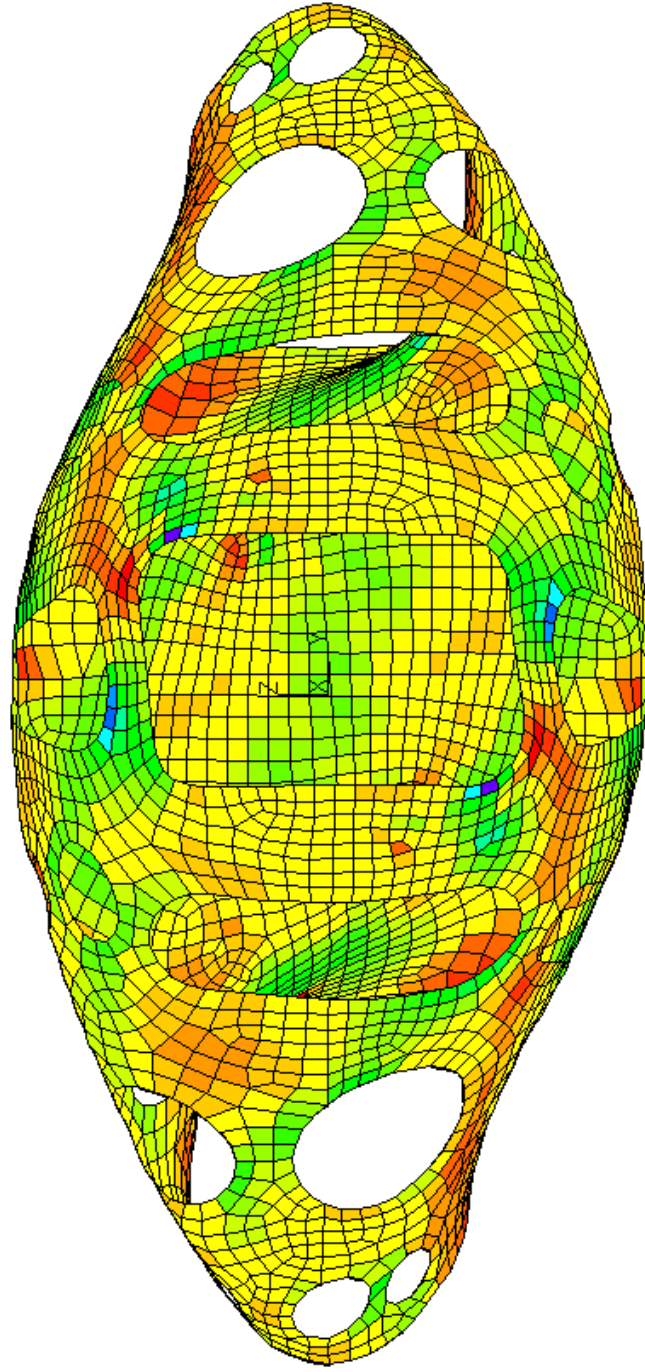


## Stress Levels

Smin.Pr.-Z1 - (psi)

Peak Smin.Pr.Z1 surf.: -5096.9

|         |
|---------|
| 1099.9  |
| 861.6   |
| 623.2   |
| 384.9   |
| 146.5   |
| -91.8   |
| -330.1  |
| -568.5  |
| -806.8  |
| -1045.1 |
| -1283.5 |
| -1521.8 |
| -1760.2 |
| -1998.5 |
| -2236.8 |
| -2475.2 |
| -2713.5 |
| -2951.9 |
| -3190.2 |
| -3428.5 |
| -3666.9 |
| -3905.2 |
| -4143.5 |
| -4381.9 |
| -4620.2 |
| -4858.6 |
| -5096.9 |



Stress Levels

Stresca-Z1 - (psi)

Peak Stresca Z1 surf.: 4923

4923.8

4734.4

4545.0

4355.7

4166.3

3976.9

3787.5

3598.1

3408.8

3219.4

3030.0

2840.6

2651.3

2461.9

2272.5

2083.1

1893.8

1704.4

1515.0

1325.6

1136.3

946.9

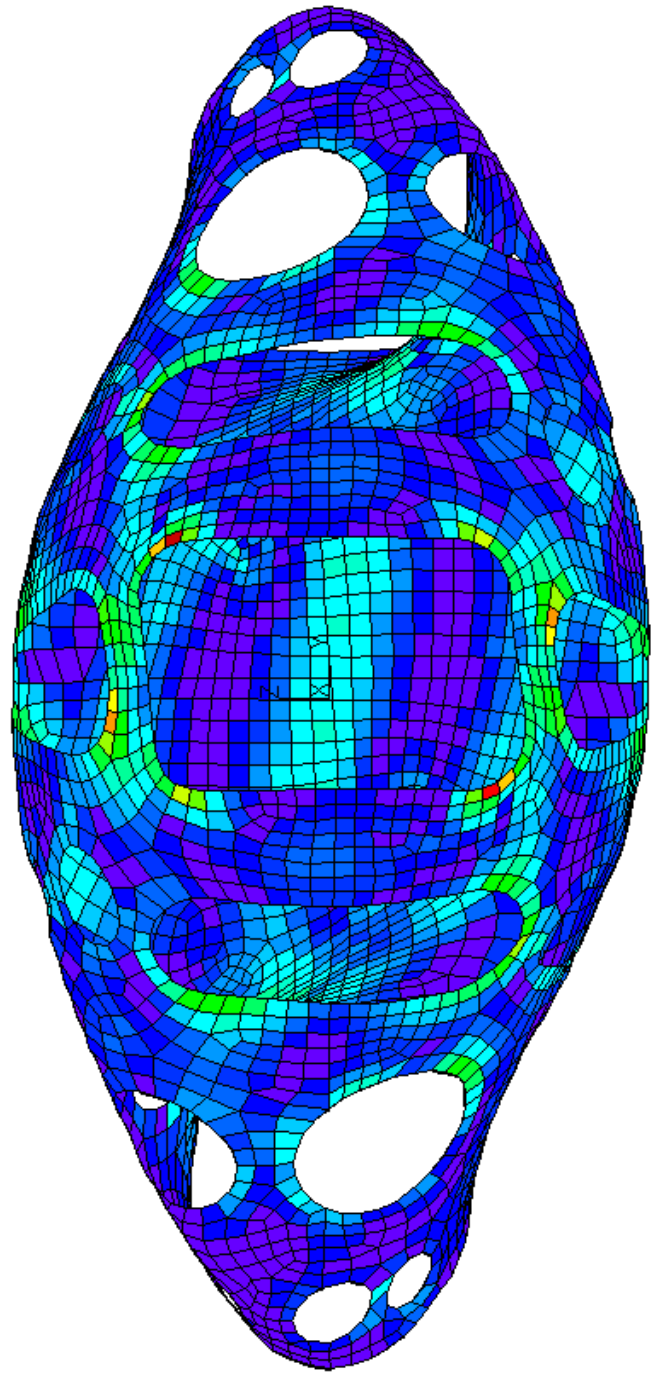
757.5

568.1

378.8

189.4

0.0



Displacements

X-displ. (Inches)

Max X-displ:0.0155

0.0155

0.0145

0.0135

0.0124

0.0114

0.0104

0.0093

0.0083

0.0073

0.0063

0.0052

0.0042

0.0032

0.0021

0.0011

0.0001

-0.0010

-0.0020

-0.0030

-0.0041

-0.0051

-0.0061

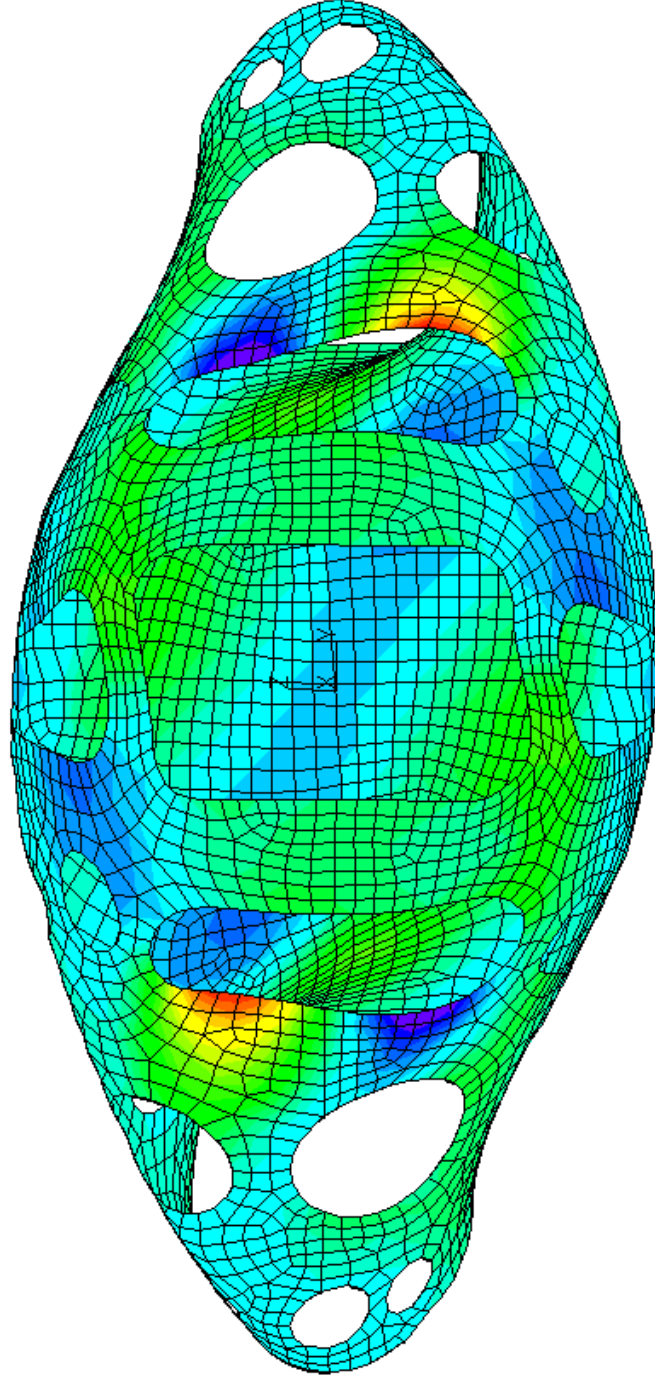
-0.0072

-0.0082

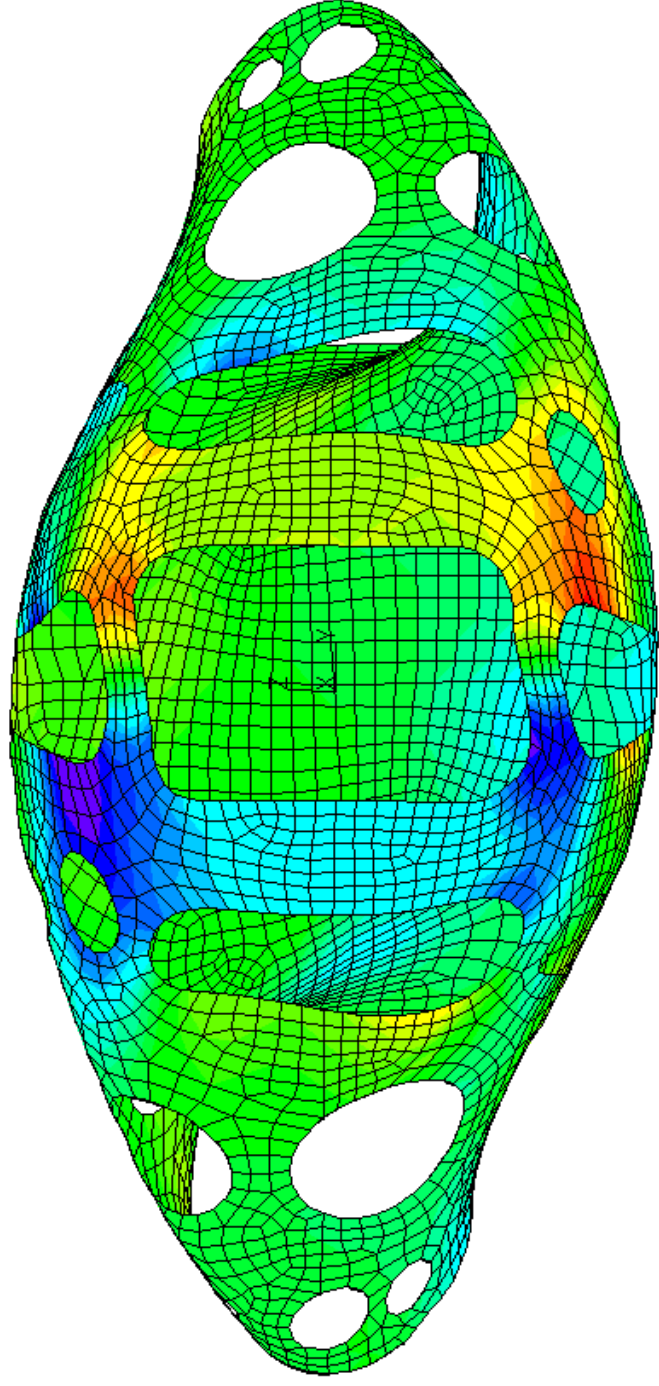
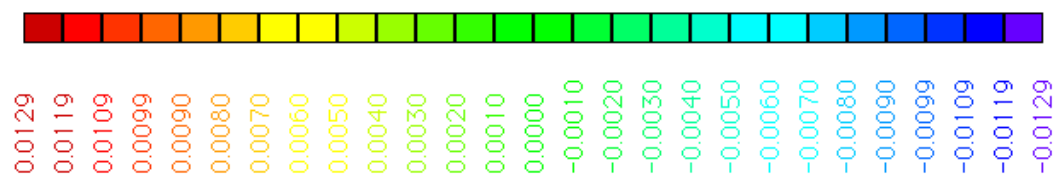
-0.0092

-0.0103

-0.0113



Displacements  
Z-displ. (Inches)  
Max Z-displ.0.0129

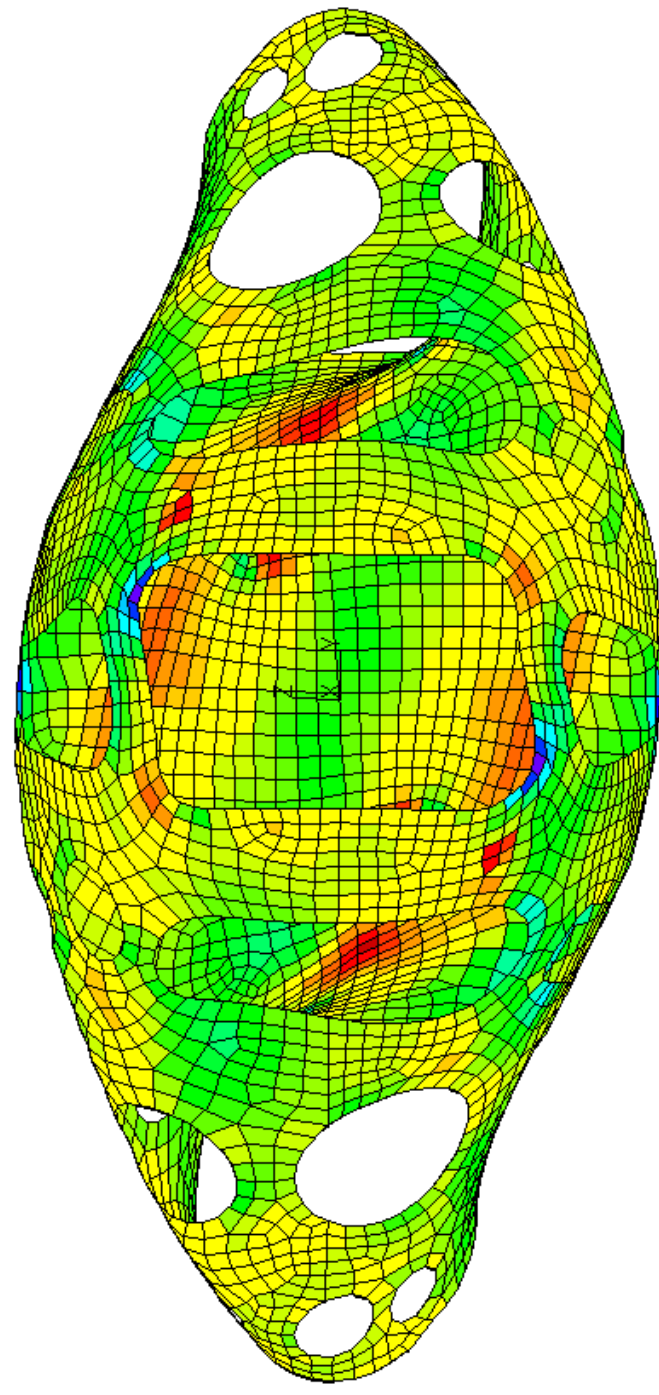


## Stress Levels

Smin.Pr.-Z2 - (psi)

Peak Smin.Pr.-Z2 surf.: -7880.3

|         |
|---------|
| 2422.3  |
| 2026.1  |
| 1629.8  |
| 1233.5  |
| 837.3   |
| 441.0   |
| 44.8    |
| -351.5  |
| -747.7  |
| -1144.0 |
| -1540.2 |
| -1936.5 |
| -2332.8 |
| -2729.0 |
| -3125.3 |
| -3521.5 |
| -3917.8 |
| -4314.0 |
| -4710.3 |
| -5106.5 |
| -5502.8 |
| -5899.1 |
| -6295.3 |
| -6691.6 |
| -7087.8 |
| -7484.1 |
| -7880.3 |



Stress Levels

Stresca-Z1 - (psi)

Peak Stresca Z1 surf.: 8124

8124.0

7811.6

7499.1

7186.7

6874.2

6561.7

6249.3

5936.8

5624.3

5311.9

4999.4

4686.9

4374.5

4062.0

3749.6

3437.1

3124.6

2812.2

2499.7

2187.2

1874.8

1562.3

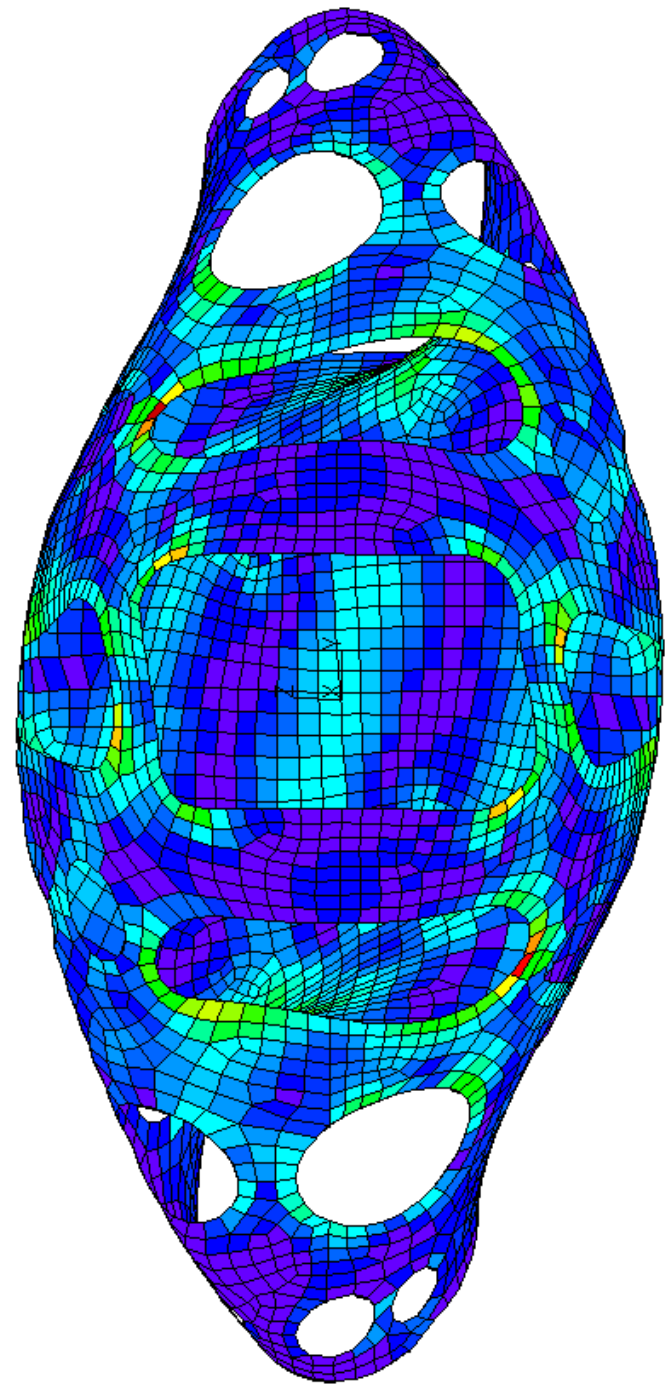
1249.9

937.4

624.9

312.5

0.0



\*Summary:

|            | 175 kA Disruption   | 350 kA Disruption     |
|------------|---------------------|-----------------------|
| Max Force  | 829 lbs             | 1819 lbs              |
| Max Displ. | 0.005”              | 0.016”                |
| Max Stress | 5096 psi (MinPr-Z1) | 8124 psi (Tresca -Z1) |

\*Results for a material Young’s Modulus of  $E = 30E6$  psi, and  $\mu = 0.3$