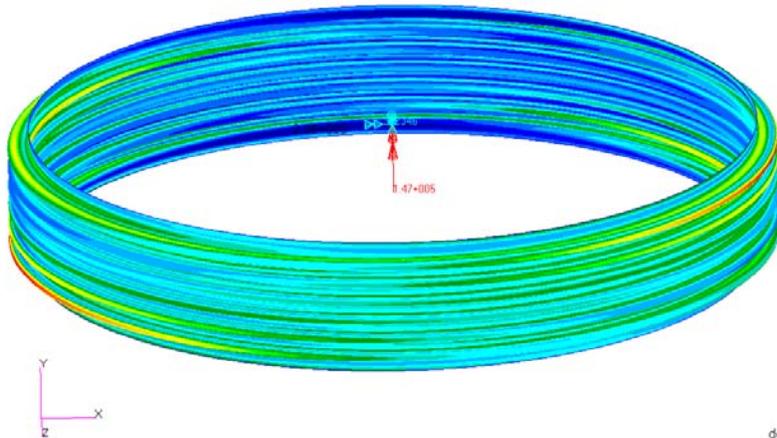


Seismic data included  
 No Axial deformation  
 Static Calculations

P. Rogoff  
 1/25/2011

MSC FEA 2010.1.2.64-Bit 25-Jan-11 09:20:03  
 Fringe: SeizShAll, A44 Static Subcase, Stress Tensor, von Mises, At Z2

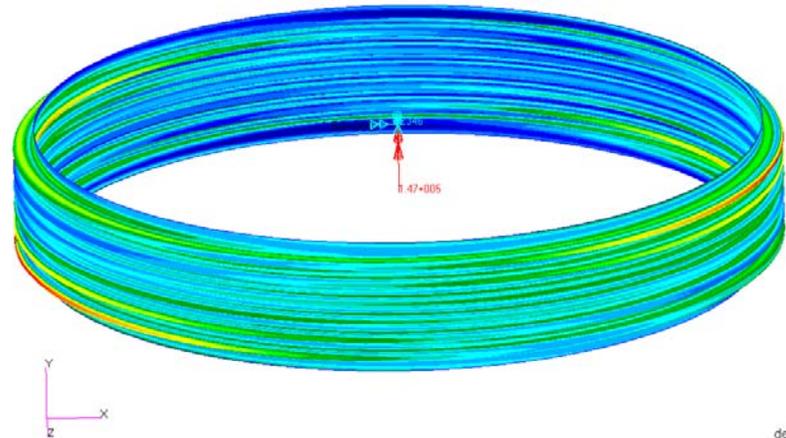
COMPLETE FEM MODEL with combined Seismic loads  
 Seismic Based on the CS total mass (Shear = 1,400.lbs at .5% damping)  
 $t_n = .03$  in,  $w = 1.095$  in,  $q = 1.0$  in.  
 STATIC PRESSURE 14.5 psi  
 Torque = 147,400. in-lbs (.00315 in torsion)  
 Note: No Axial deformation applied



default\_Fringe :  
 Max 1.46+004 @Nd 49288  
 Min 2.96+003 @Nd 14557

MSC FEA 2010.1.2.64-Bit 25-Jan-11 09:14:22  
 Fringe: SeizShAll, A44 Static Subcase, Stress Tensor, Max Shear, At Z2

COMPLETE FEM MODEL with combined Seismic loads  
 Seismic Based on the CS total mass (Shear = 1,400.lbs at .5% damping)  
 $t_n = .03$  in,  $w = 1.095$  in,  $q = 1.0$  in.  
 STATIC PRESSURE 14.5 psi  
 Torque = 147,400. in-lbs (.00315 in torsion)  
 Note: No Axial deformation applied



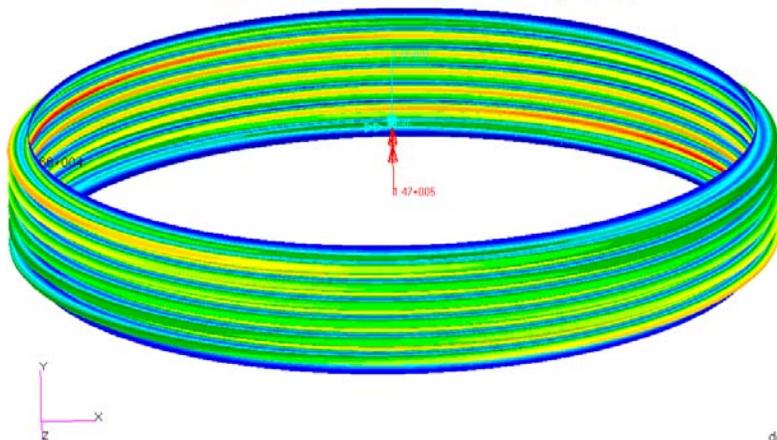
default\_Fringe :  
 Max 8.34+003 @Nd 49288  
 Min 1.59+003 @Nd 14068

## Seismic Data Including Axial deformation due to the Cs thermal expansion

MSC FEA 2010.1.2.64-Bit 25-Jan-11 09:36:33

Fringe: SeizShAll, A44 Static Subcase, Stress Tensor, , von Mises, At Z2

COMPLETE FEM MODEL with combined Seismic loads  
 Seismic Based on the CS total mass (Shear = 1,400.lbs at .5% damping)  
 $t_n = .03$  in,  $w = 1.095$  in,  $q = 1.0$  in.  
 STATIC PRESSURE 14.5 psi  
 Torque = 147,400. in-lbs (.00315 in torsion)  
 Delta Y = -.315 in = 8 mm (CS thermal expansion)

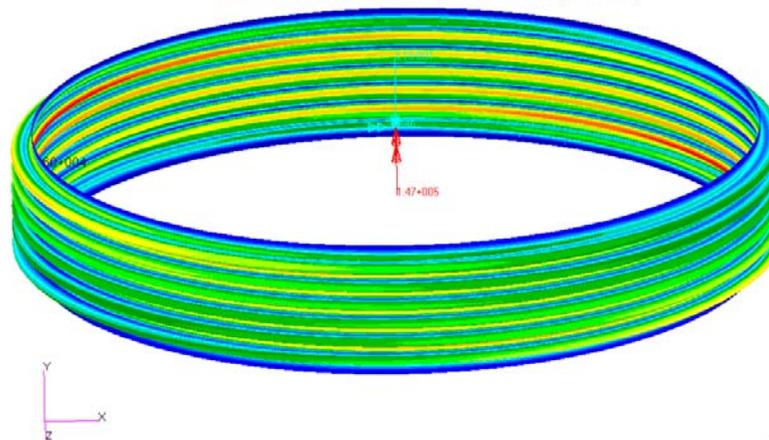


default\_Fringe :  
 Max 4.66+004 @Nd 49387  
 Min 2.21+003 @Nd 12436

MSC FEA 2010.1.2.64-Bit 25-Jan-11 09:39:29

Fringe: SeizShAll, A44 Static Subcase, Stress Tensor, , Max Shear, At Z2

COMPLETE FEM MODEL with combined Seismic loads  
 Seismic Based on the CS total mass (Shear = 1,400.lbs at .5% damping)  
 $t_n = .03$  in,  $w = 1.095$  in,  $q = 1.0$  in.  
 STATIC PRESSURE 14.5 psi  
 Torque = 147,400. in-lbs (.00315 in torsion)  
 Delta Y = -.315 in = 8 mm (CS thermal expansion)



default\_Fringe :  
 Max 2.60+004 @Nd 49387  
 Min 1.28+003 @Nd 12436

The next slide shows Seismic results which were obtained from the the complete NSTX update structure simulation with ANSYS 12.1. This work was completed by P. Titus and it is also available under a different calculation report. (See, NSTXU-CALC-10-01-02 )

These calculations were completed using the standard seismic scenario for the TFTR facilities with .05% damping.

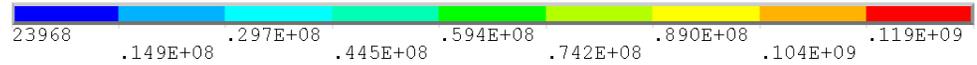
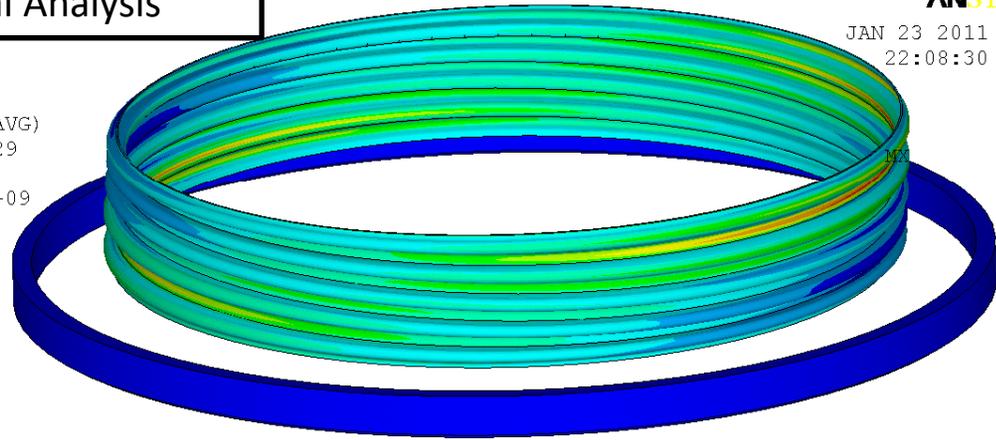
Both calculations show maximum stress results well within the material Yield allowable for the Inconel bellows.

### Bottom Bellows Static .5g Lateral Analysis

```
STEP=2
SUB =1
TIME=2
SEQV (AVG)
DMX =.002329
SMN =23968
SMX =.134E+09
```

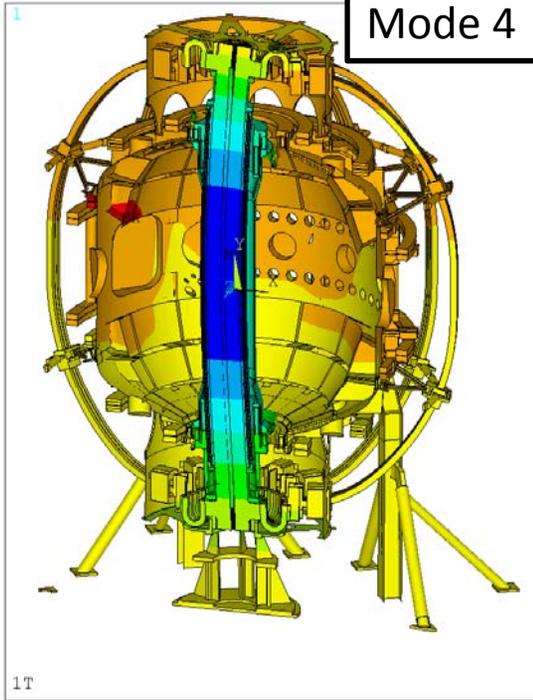
ANSYS

JAN 23 2011  
22:08:30



nstxU Deadweight Plus .5g Lateral(Seismic?) Load

### Mode 4

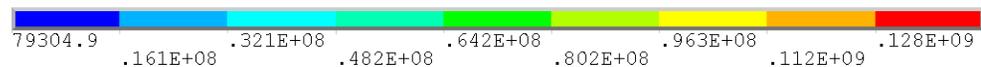
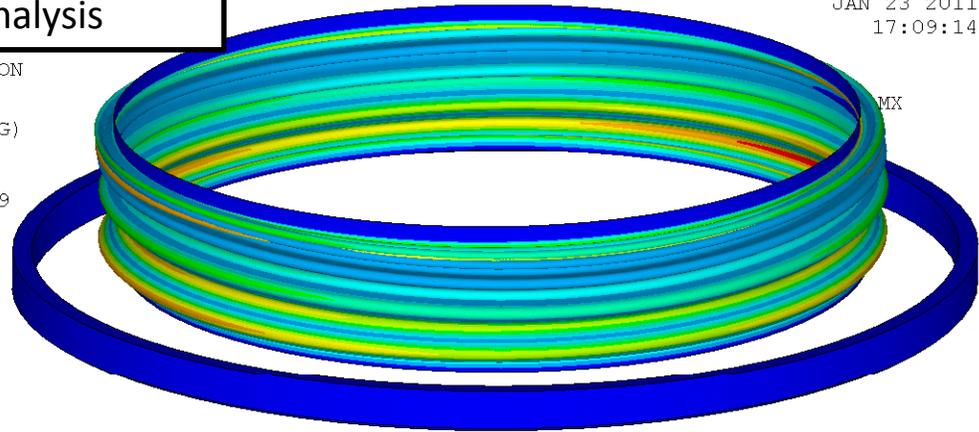


### Bottom Bellows Modal Analysis

```
NODAL SOLUTION
STEP=9999
SEQV (AVG)
DMX =.00387
SMN =79304.9
SMX =.144E+09
```

ANSYS

JAN 23 2011  
17:09:14



1T