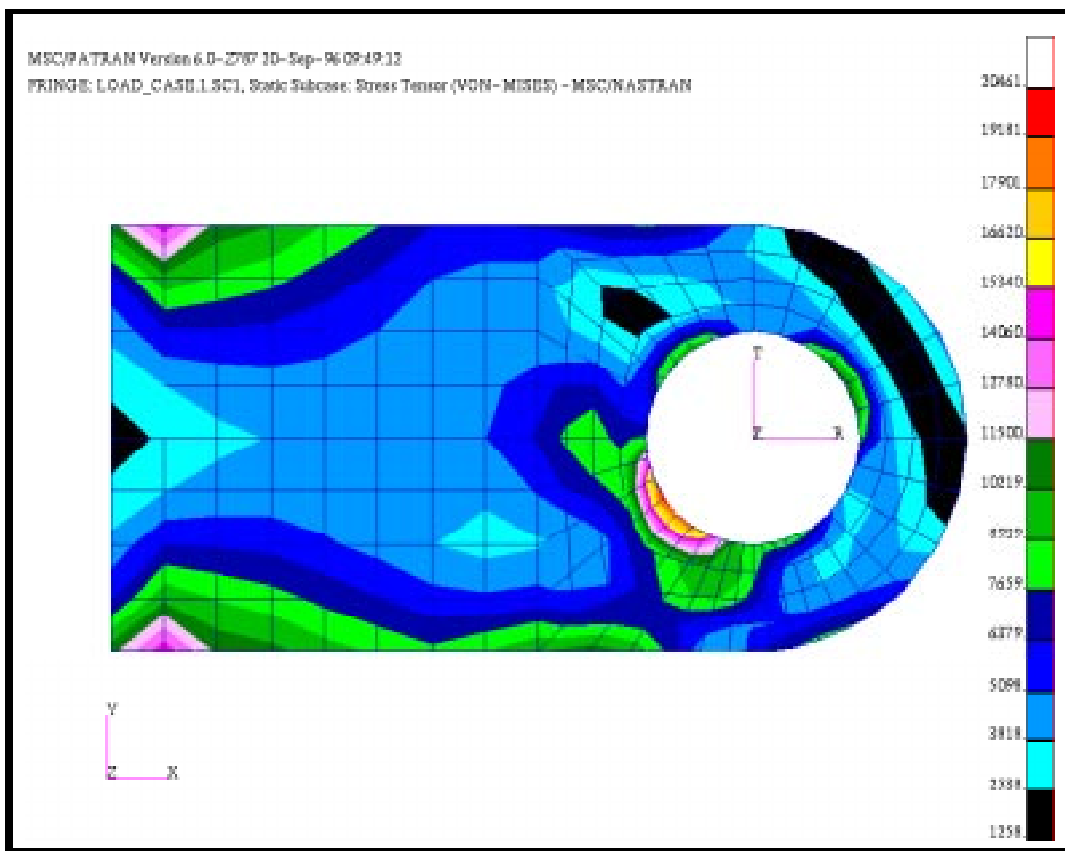


WORKSHOP 4

Post Processing of Stress Results



Objectives:

- To post-process stress results from MSC/NASTRAN.
- To use MSC/PATRAN to create fill and fringe plots to determine if the analyzed part will meet a customer-defined criteria or whether the part needs to be re-designed and re-analyzed.



Model Description:

In this exercise, you will examine the stress results of the clevis model analyzed using the MSC/NASTRAN code by rendering a variety of fringe and element fill plots.

Exercise Procedure:

1. Create a new database and name it **clevis2**.

Type **p3** in your xterm. The *Main Window* and *Command Window* will appear.

File/New ...

New Database Name:

clevis2.db

OK

The viewport (PATRAN's graphics window) will appear along with a *New Model Preference* form. The *New Model Preference* sets all the code specific forms and options inside MSC/PATRAN.

In the *New Model Preference* form set the *Tolerance* to **Default**.

Tolerance:

◆ **Default**

Analysis Code:

MSC/NASTRAN

Analysis Type:

Structural

OK

2. Import the new clevis model and results for this exercise by reading the output2 file **clevis.op2**.

◆ **Analysis**

Action:

Read Output2

Object:

Both

Method:

Translate

Select Results File...

Selected Results File:

clevis.op2

OK

Apply

3. First create a fringe plot of the Von Mises stress in the clevis, first with the Results form.

◆ **Results**

Action:

Create

Object:

Quick Plot

Click on the **Select Results** icon at the top of the Results form



Select Results Case

LOAD_CASE.1

Select Fringe Results

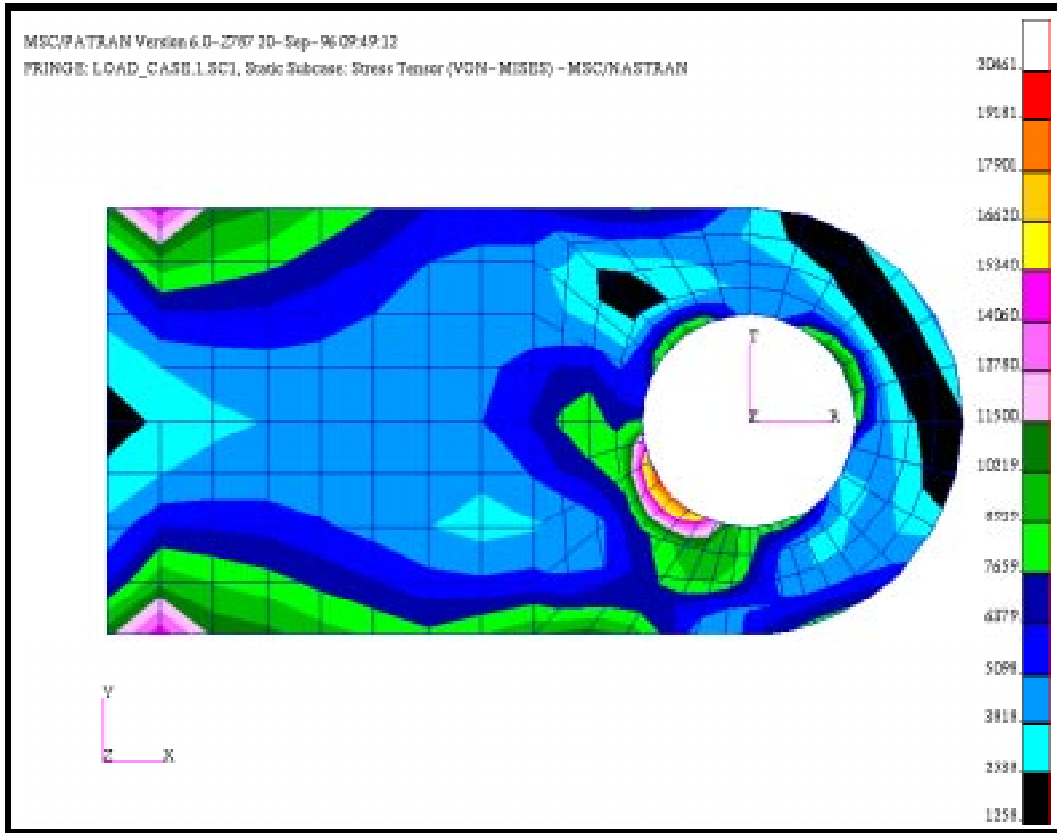
Stress Tensor

Quantity:

Von Mises

Apply

Figure 4.1 - Fringe Plot of Von Mises Stresses



4. Create and assign a new numerical range to the viewport. Use the name, **my_range**, and the values **Start= 22000** and **End=1000** to define the new range containing **15** subrange levels.

Display/Ranges...

Create ...

New Range Name:

my_range

OK

Data Method:

◆ **Semi-Auto**

Start:

22000

End:

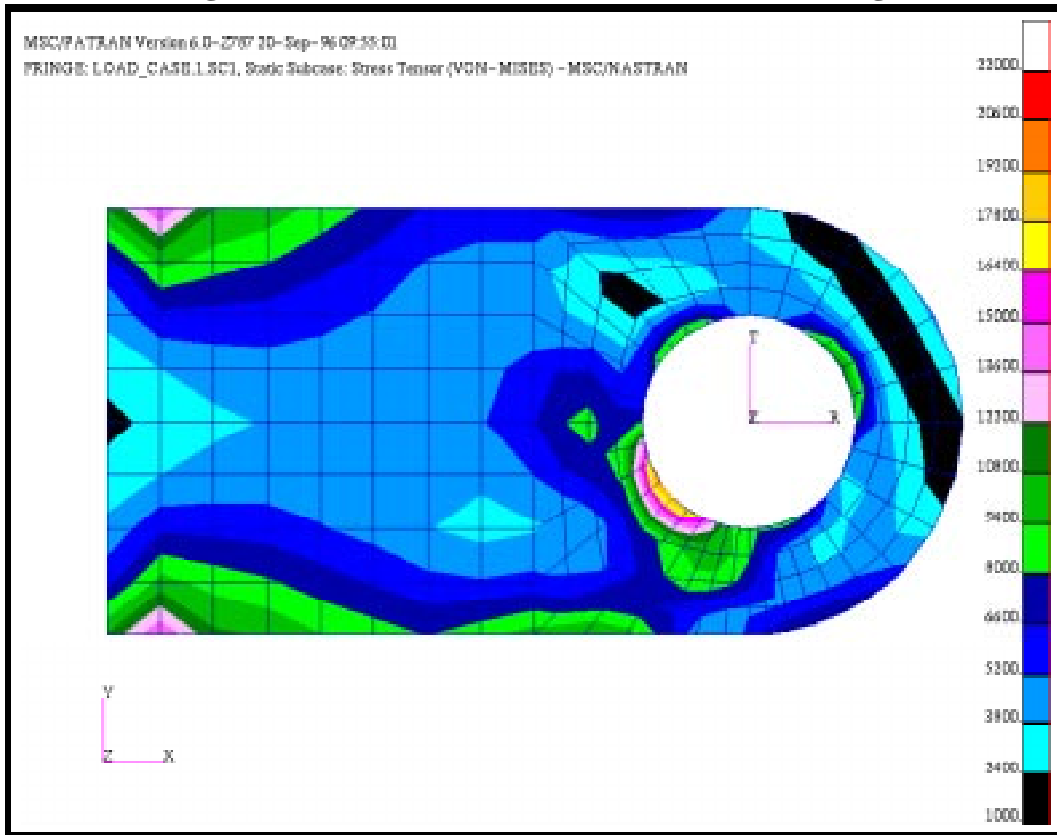
1000

Calculate

Apply

Assign Target Range to Viewport

Figure 4.2 - Von Mises Stress Plot with custom Range



5. Change the results label format to Integer.

◆ Results

Action:

Create

Object:

Quick Plot

Change the results form to **Fringe Attributes** by selecting this icon:



Label Style ...

Label Format:

Integer

OK

Apply

- Render an element fill plot of the Von Mises stresses.

◆ **Results**

Action:

Create

Object:

Fringe

Select the **Plot Options** icon:



Domain:

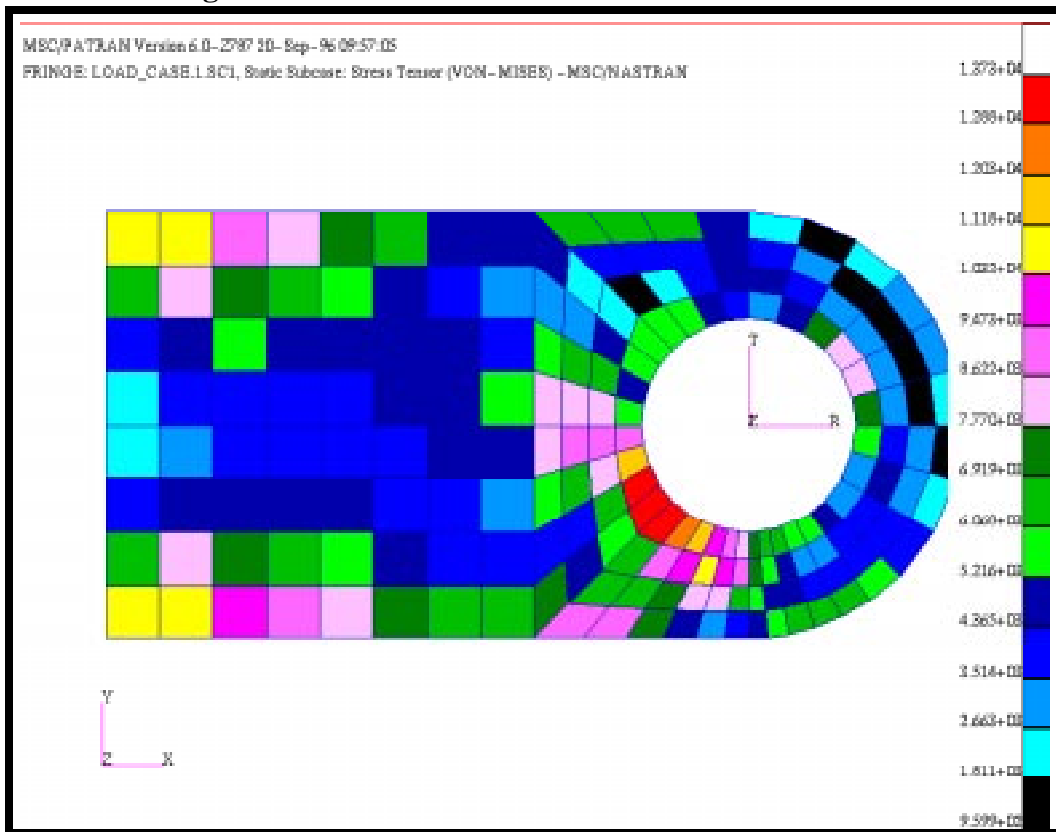
None

Extrapolation:

Average

Apply

Figure 4.3 - Element Fill Plot of Von Mises Stresses



-
7. Create a fringe plot of the maximum principal stress for elements 1 through 24 only.

Action:

Object:

Click on the **Select Results** icon at the top of the Results form



Select Results Case

Select Fringe Results

Quantity:

To select only Elements 1:24 click on the **Target Entities** icon



Target Entity:

Select Elements

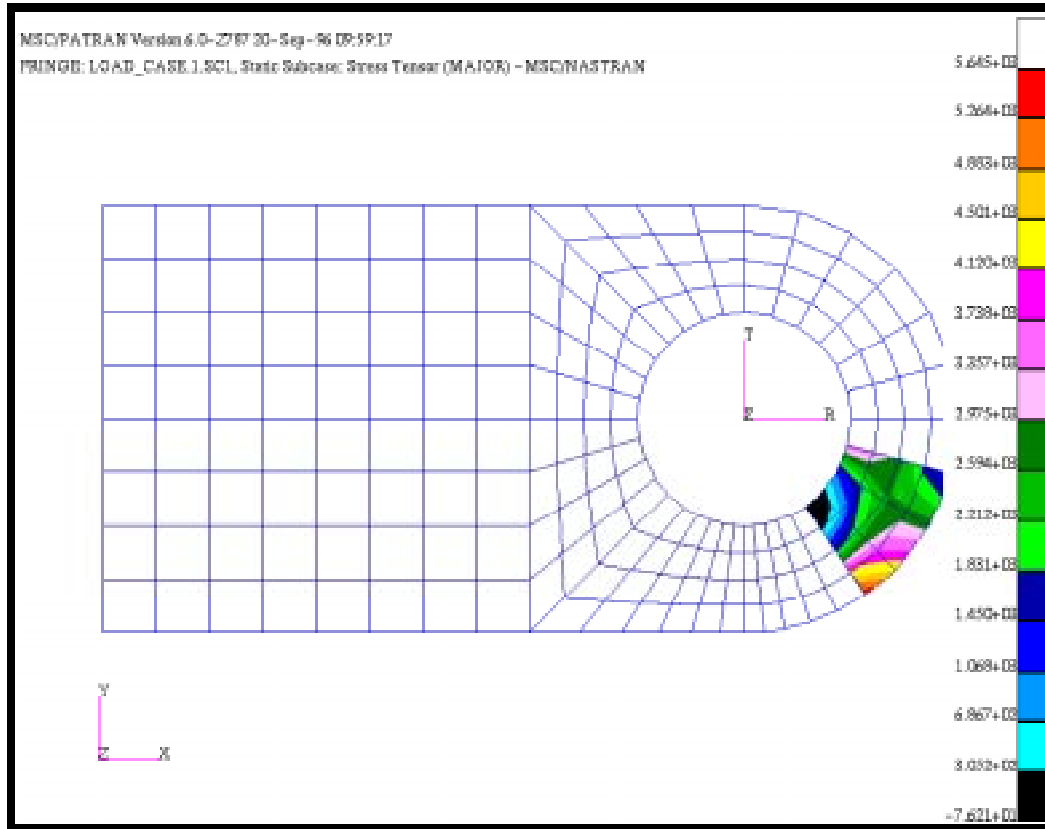
Select the **Plot Options** icon:



Domain:

Extrapolation:

Figure 4.4 - Principal Stresses of Filtered Elements 1 thru 24



8. Convert the stress tensor results to the scalar σ_{xx} , and create a fringe plot of the scalar with respect to the cylindrical coordinate system you created when building the clevis model. Plot the results on all elements.



Select Results Case

LOAD_CASE.1

Select Fringe Results

Stress Tensor

Quantity:

X Component

Select the **Target Entities** icon



Target Entity:

Elements

Select Elements

Select all visible elements

Select the **Plot Options** icon:



Coordinate Transformation:

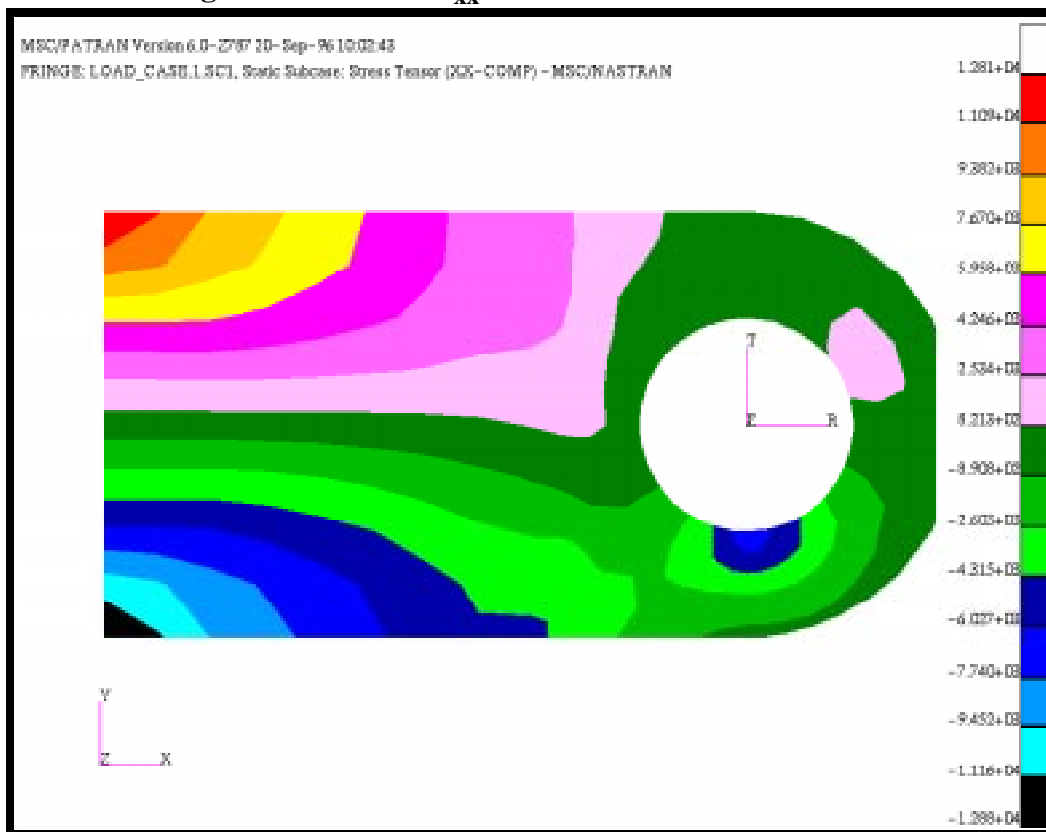
CID

Select Coordinate Frame

Coord 1

Apply

Figure 4.5 - Plot of σ_{xx} Stresses



9. In the default viewport, create a Von Mises stress plot. Create another viewport containing only FEM and plot the 1st invariant with a customized range.

10. The first thing to do is to create a Von Mises fringe plot in the existing viewport.



Select Results Case	<input type="text" value="LOAD_CASE.1"/>
Select Fringe Results	<input type="text" value="Stress Tensor"/>
Quantity:	<input type="text" value="Von Mises"/>
<input type="button" value="Apply"/>	

Now, create a new viewport called **view**.

Viewport/Create...

New Viewport Name:	<input type="text" value="view"/>
<input type="button" value="Apply"/>	
<input type="button" value="Cancel"/>	

Now, create a new group call **fem1**, containing only FEM.

Group/Create...

New Group Name:	<input type="text" value="fem1"/>
<input checked="" type="checkbox"/> Make Current	
<input checked="" type="checkbox"/> Unpost All Other Groups	
Group Contents:	<input type="text" value="Add All FEM"/>
<input type="button" value="Apply"/>	
<input type="button" value="Cancel"/>	

Now, create a new range called **range1**, spanning from 20,000 to -20,000.

Display/Ranges...

<input type="button" value="Create ..."/>	
New Range Name:	<input type="text" value="range1"/>

OK

Data Method:

◆ **Semi-Auto**

Start:

20000

End:

-20000

Calculate

Apply

Assign Target Range to Viewport

Cancel

Finally, create a plot of the 1st invariant.



Select Results Case

LOAD_CASE.1

Select Fringe Results

Stress Tensor

Quantity:

1st Invariant

Apply

A message will appear, asking “Do you want to overwrite range ‘range1’?” Respond **No**.

No

A warning will appear, stating that the “range of values in spectrum may not reflect the range of current results”. Clear this warning.

OK

Figure 4.6 - Von-Mises Stress Plot

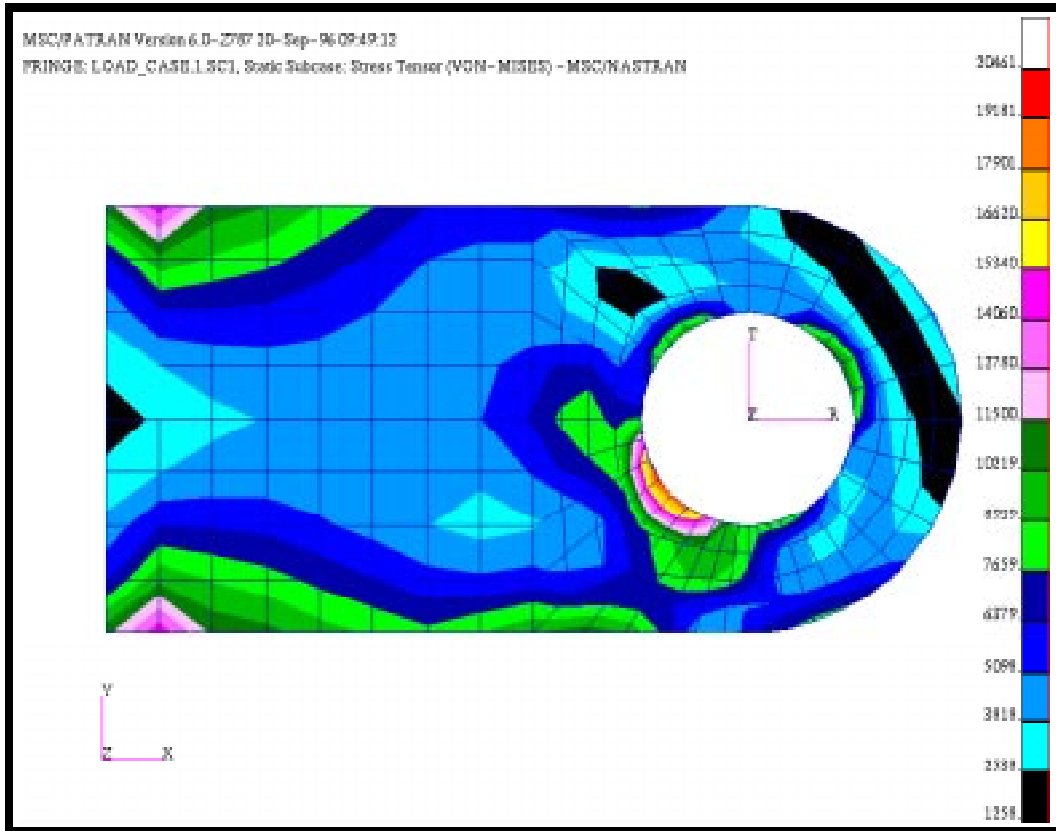
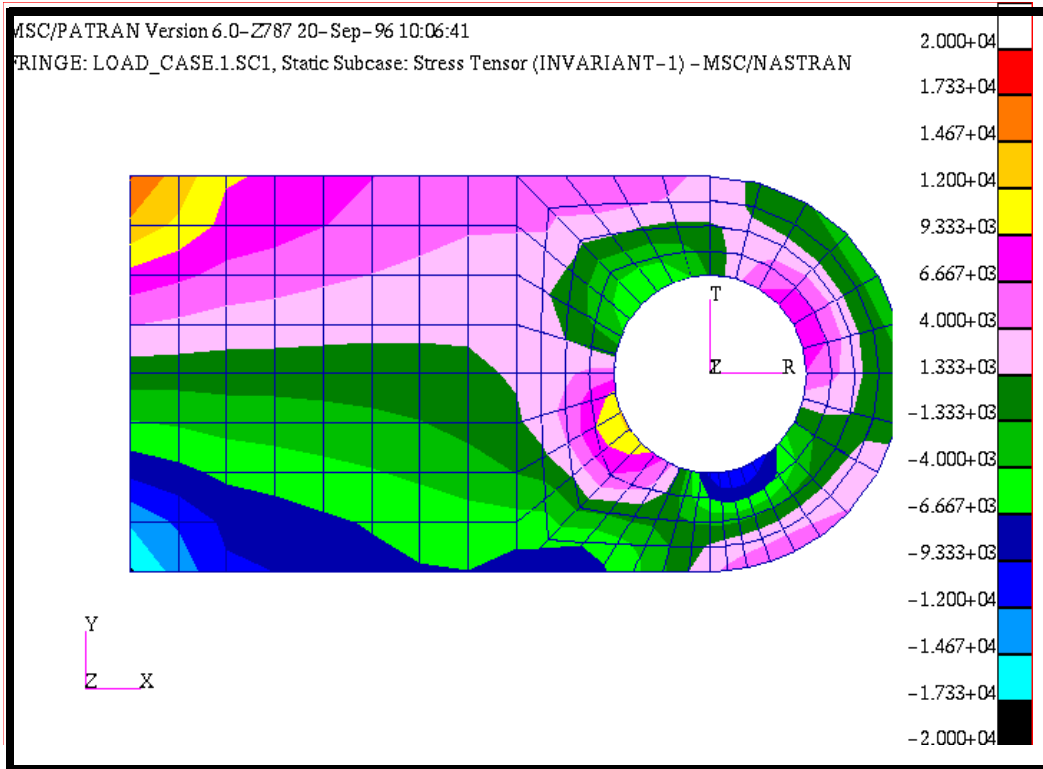


Figure 4.7 - 1st Invariant Plot with Custom Range



When done comparing the results plots in the two viewports, close the database and quit MSC/PATRAN.

File/Quit

This ends the exercise.