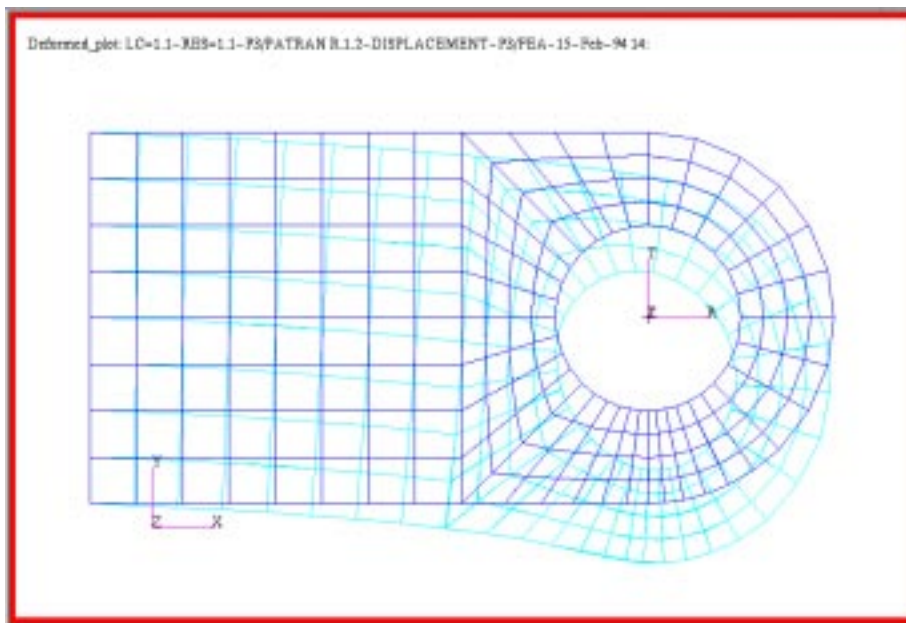# LESSON 16

Post Processing of Displacement Results

Objectives:

■ Examine the deformation of the MSC/NASTRAN model to evaluate the validity of the assumptions made in the creation of the mesh density and selection of element type.

■ Use the "Basic" and "Advanced" results post-processing forms.

Model Description:

In this exercise you will examine the analysis results of a clevis model, similar to the one you created during the previous labs, by rendering a variety of deformed shape plots of the model. In particular, you will create Deformed, Fringe, and Vector plots of the displacement.

Suggested Exercise Steps:

■ Create a new database and name it **clevis.db**.

■ Change the *Tolerance to Default* and the *Analysis Code* to **MSC/NASTRAN**.

■ Import the new clevis model and results for this exercise by reading the MSC/NASTRAN output2 file **clevis.op2**.

■ Create a deformed shape plot of the **Displacement** result values.

■ Turn off the undeformed plot of the clevis model. Change the orientation of the deformed image of the clevis model to an **Isometric view**. Render the deformed plot using a **Hidden Line** render style.

■ Return to the **Default view** of the clevis model. Increase the *Deformation Scale Factor* to **0.25**.

■ Produce a fringe plot of the displacement in the y-direction, (u_y). Render the plot with the element edges turned off.

■ Produce a vector plot of the y-component of the displacements superimposed on the fringe plot of the clevis model. Change the render style of the clevis model to wire frame. Change the vector *Scale Factor* to **0.25** and use a **Model** *Scale Length*.

■ Turn off the result vectors and the spectrum color bar in the viewport.

Exercise Procedure:

1. Create a new database and name it **clevis.db**.

File/New...

New Database Name	**clevis**

OK

2. Change the *Tolerance* to **Default** and the *Analysis Code* to **MSC/NASTRAN**.

New Model Preference

Tolerance ◆ **Default**

Analysis Code: **MSC/NASTRAN**

OK

Import the model and results

3. 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

There are two approaches for post processing results in MSC/ PATRAN. One approach is to use the multi-purpose (e.g. fringe, deformation, and animate) **Quick Plot** form. The other is to use response type specific forms, e.g. deformation.

These advanced forms, are designed to allow the user more flexibility on the manipulation and rendering of the model, however this requires more user input compared to the Quick Plot form.

Create a Deformed Shape Plot

4. Create a deformed shape plot of the **Displacement** result values.

◆ **Results**

Action: **Create**

Object: **Quick Plot**

Select Result Case(s) **Load_Case.1.SC1**

Select Deformation Result | **Displacements, Translational** |

| **Apply** |

Your model should look like the one shown below.
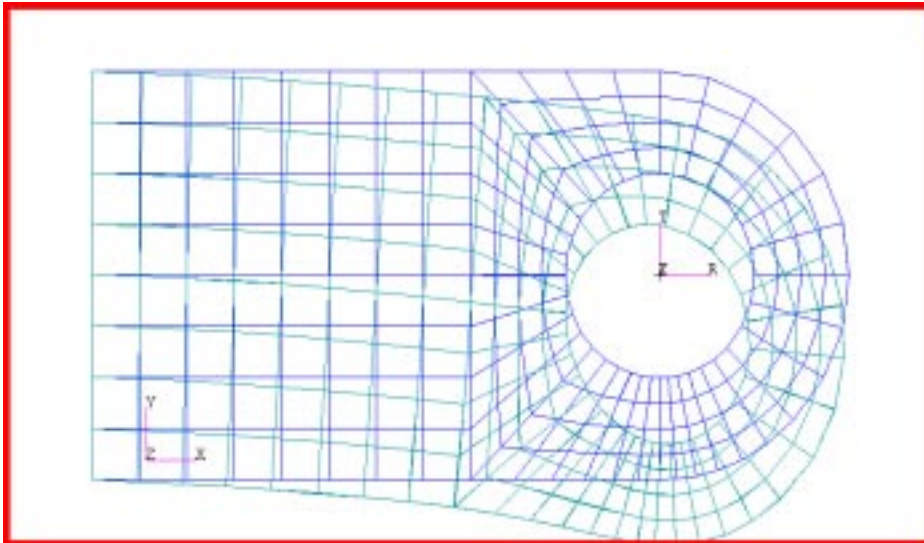
5.   Turn off the undeformed plot of the clevis model.

By default the deformed and undeformed plots are superimposed. Turn off the undeformed plot using **Create, Deformation, Display Attributes** under Results.

Action: | **Create** |

Object: | **Deformation** |

Select Result Case(s) | **Load_Case.1.SC1** |

Select Deformation Result | **Displacements, Translational** |

To change the **Display Attributes** click on the Display Attributes icon in the results form.

☐ **Show Undeformed**

| **Apply** |

Change the *view* to **Iso 1 View** by clicking on this icon in the toolbar.

6.   Return to the **Front** view of the clevis model, and increase the *Deformation Scale Factor* to **0.25**.

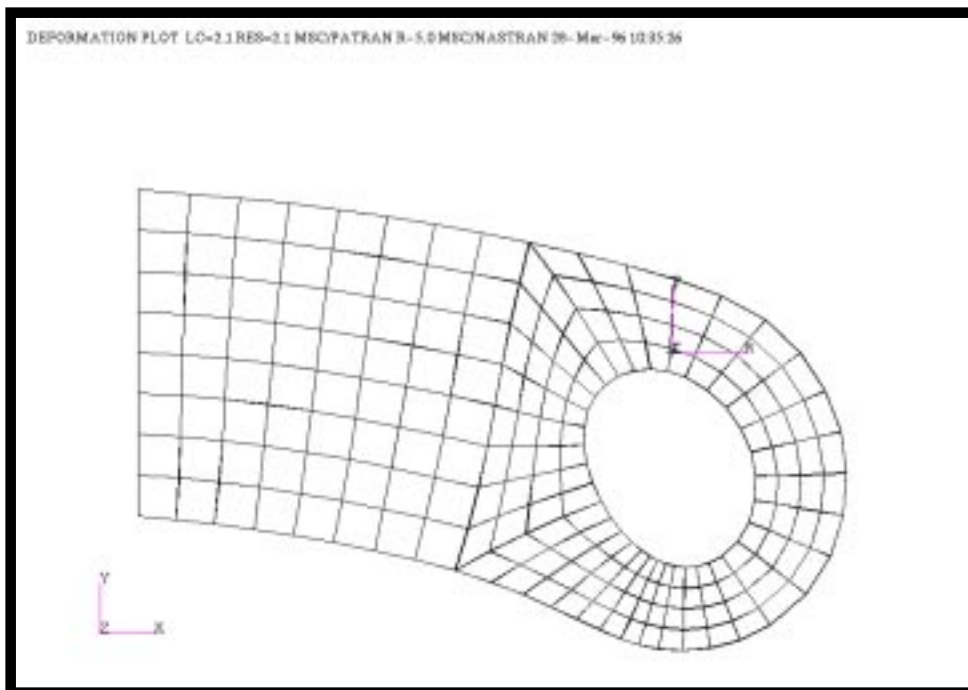Click on the *Front View* icon from the toolbar.

Scale Factor:	**0.25**

Apply

Your model should look like the one shown below.

DEFORMATION PLOT LC=2.1 RES=2.1 MSC/PATRAN R-5.0 MSC/NASTRAN 26-Mar-96 10:35:36

**Create a
Fringe Plot**

7.   Produce a fringe plot of the displacement in the y-direction, (u_y). Render the plot with the element edges turned off.

Object:	**Quick Plot**
Select Result Cases	**Load_Case.1.SC1**

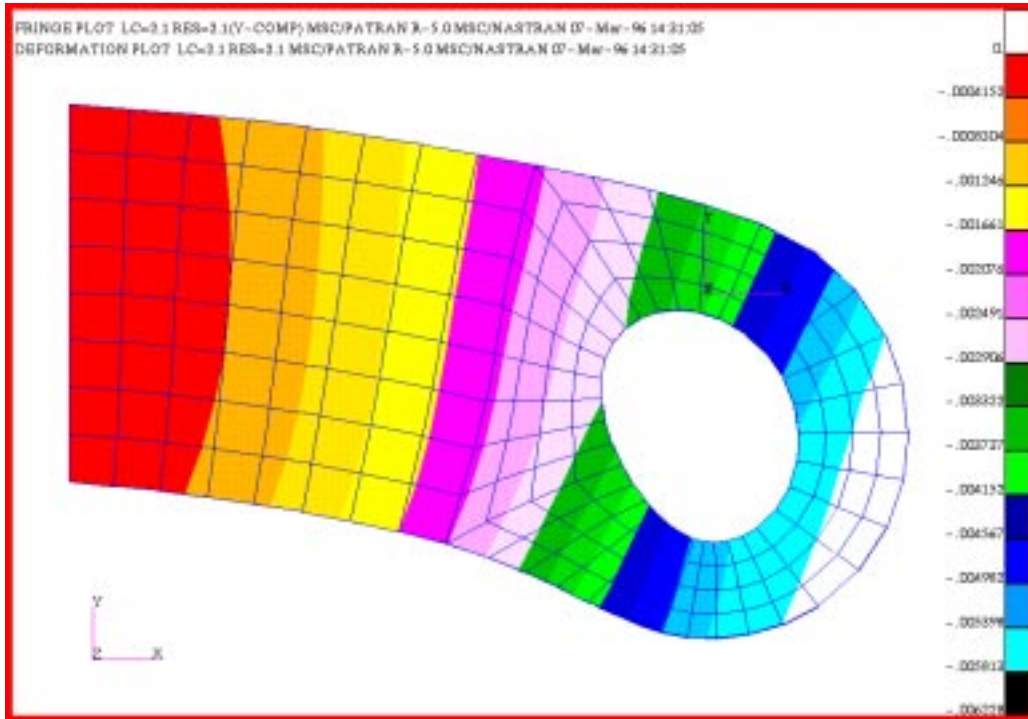| *Select Fringe Result* | **Displacements, Translational** |
| *Quantity* | **Y-Component** |
| *Select Deformation Result* | **Displacements, Translational** |

Apply

The fringe plot of the displacements is shown below.

FRINGE PLOT LC=3.1 RES=3.1(Y-COMP) MSC/PATRAN R-5.0 MSC/NASTRAN 07-Mar-96 14:31:05
DEFORMATION PLOT LC=3.1 RES=3.1 MSC/PATRAN R-5.0 MSC/NASTRAN 07-Mar-96 14:31:05

Next, turn off the display of Finite Element Edges

Display/Shading ...

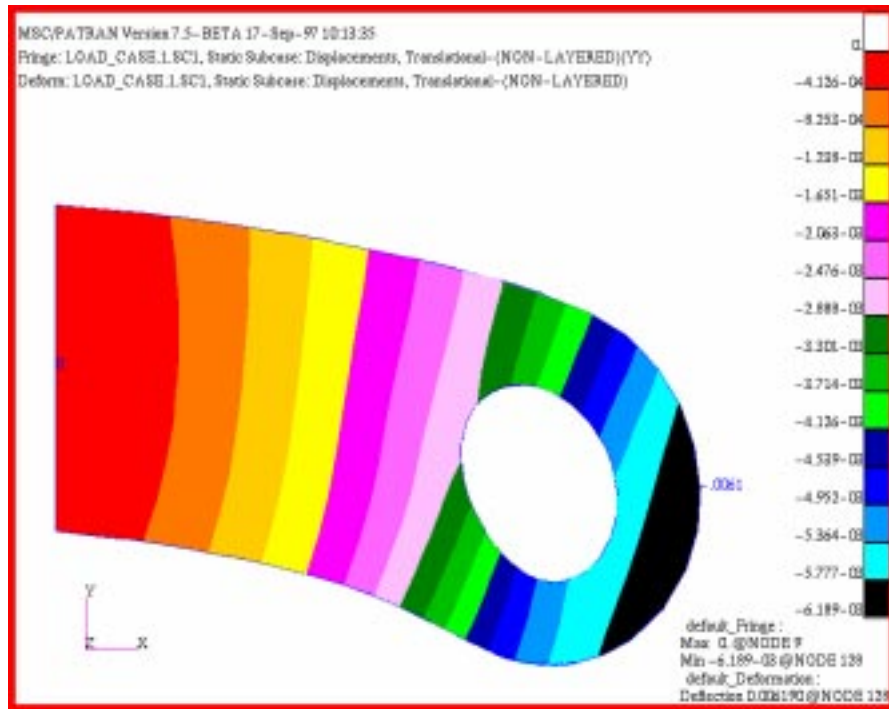*Edges*   ☐ **Show Edges**

Apply

Cancel

**Turn off
Finite
Element
Edges**

With the Element edges turned off your model should look like the one shown below

Turn the element edge display back on before you start the next step

8. Produce a vector plot of the y-component of the displacements superimposed on the fringe plot of the clevis model. Change the render style of the clevis model to **wireframe**. Change the vector *Scale Factor* to 0.25 and use a **Constant** *Scale Length.*

The Displacements can also be displayed as a vector plot. In order to use this option, you must first change the *Form Type* Create, Marker, in the *Results* form.

Action:	**Create**
Object:	**Marker**
Method:	**Vector**
Select Result Case(s)	
	Load_Case.1.SC1
Show as	**Component**
	☐ XX ■ YY ☐ ZZ
Apply	

Display a Vector Plot

Turn off the Fringe and Deformation plots you created in the previous step by changing the **Action** to **Post** and the **Object** to **Plots**. Select the vector plot in the Existing Plot Types databox,

Action:	**Post**
Object:	**Plots**
Existing Plot Types:	**VEC_default_Vector**

Apply

9.   Adjust the vectors attributes and scale.

Action:	**Create**
Object:	**Marker**
Method:	**Vector**
Show as	**Component**

Vector Attributes such as color, size, and magnitude scaling can be altered in the Results, Create, Marker, Vector form. Click the **Display Attributes** button, and then try changing the vector Scale Factor to 0.25 using a **Constant-Model** *Scaled Length.* Change view to **iso 1 view**.

10.   Click on the Display Attributes.
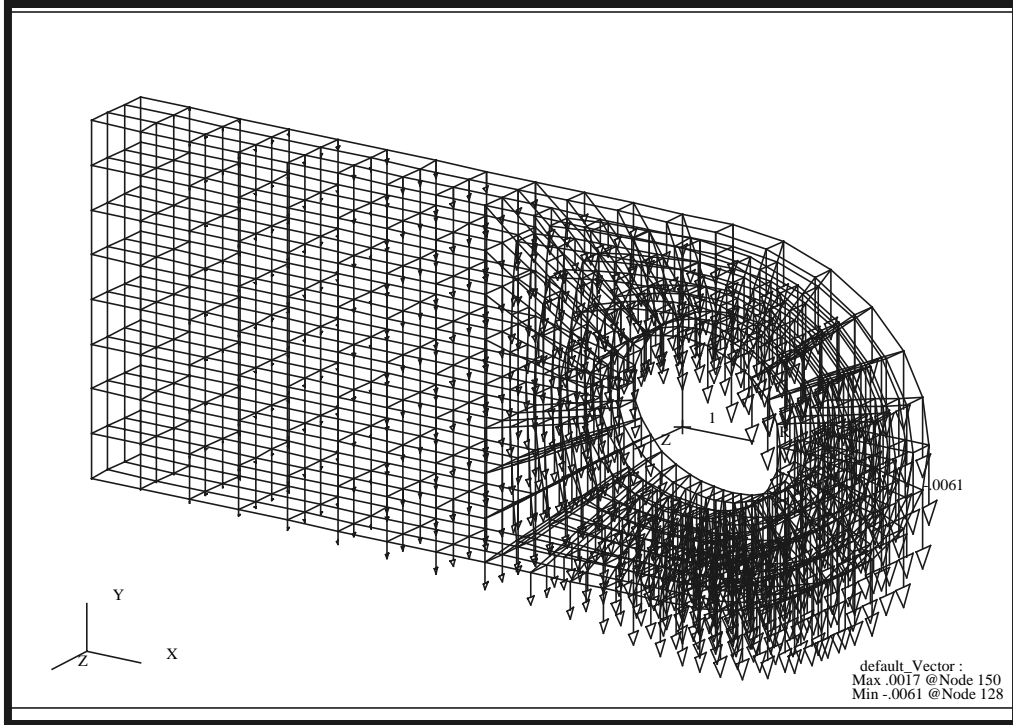
■ **Constant**

Vector definition

Length:	**Model Scaled**
Anchor Style:	•———◁▷

☐ **Show vector label**

☐ **Show on deformed**

Apply

The vector plot of the displacements is shown below.

default_Vector :
Max .0017 @Node 150
Min -.0061 @Node 128

**Turn off
Vector Plot**

Turn off the vector plot and post the deformed plot.

Action: **Post**

Object: **Plots**

Existing Plot Types: **DEF_default_Deformation**

Apply

Do a simple 3D animation of the deformed shape.

Action: **Create**

Object: **Quick Plot**

Click on the Animation Options button.

Change the **Animate Method** to **Modal** and the Animation Graphics to **3D**.

☐ **Animate Deformation**

Animation Method: **Modal**

Animation Graphics   ◆ **3D**

Number of Frames | **15** |

| **Apply** |

 Select the Results Button

Select Result Case(s)

| **Load_Case.1.SC1** |

Select Deformation Result | **Displacements, Translational** |

■ **Animate**

| **Apply** |

Try using the middle mouse button to rotate the model while it is animating. Hit **Stop Animation** when done.

This ends the lesson. **Close** the database and quit Patran.

| **File/Quit** |