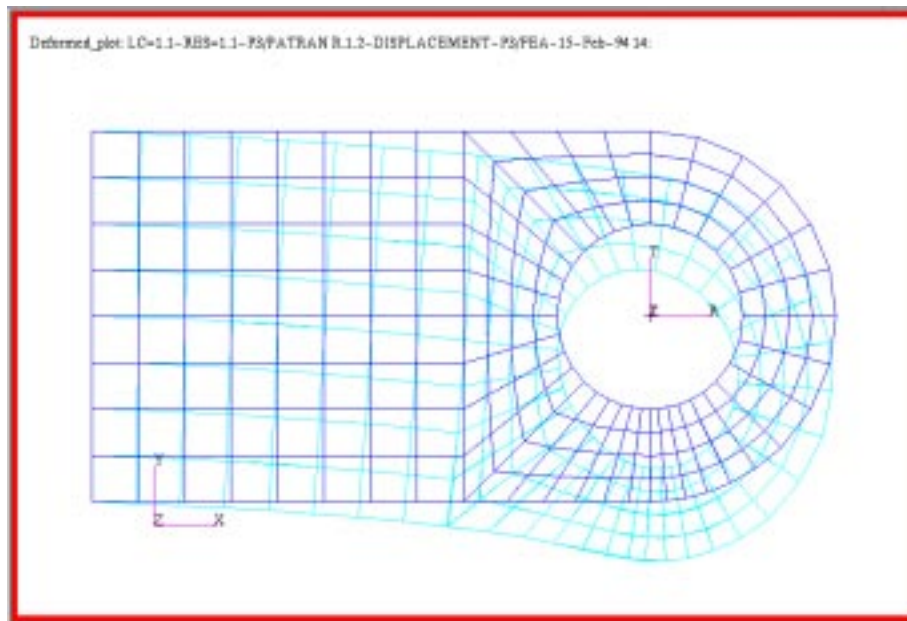


## WORKSHOP 15

# *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.



## 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**.
- 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. Use a **Model Scale Length**.
- Produce a 3D animation of the deformed shape.

## Exercise Procedure:

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

File/New...

New Database Name

clevis

OK

- 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**

- 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 of the **Displacement** result values.

**Create a Deformed Shape Plot**

◆ **Results**

*Action:* **Create**

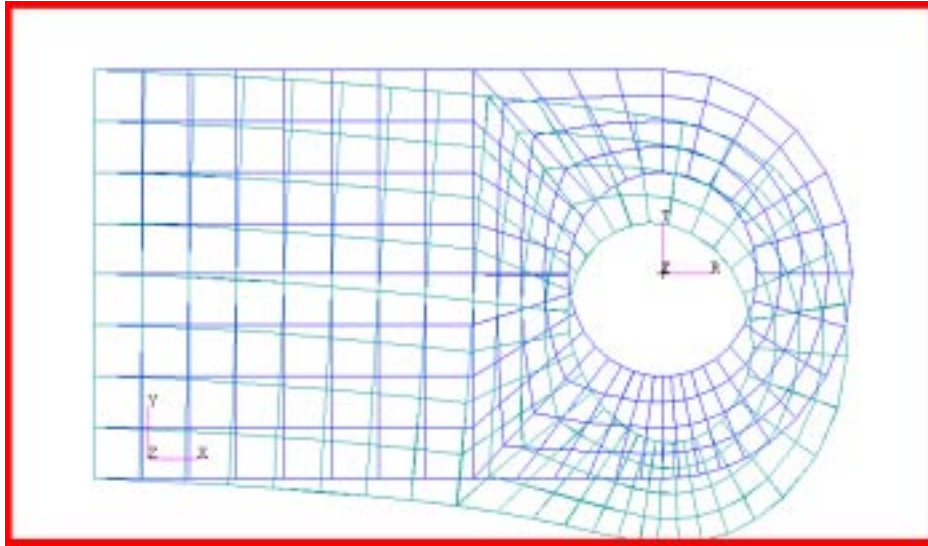
*Object:* **Quick Plot**

*Select Result Case(s)* **Load\_Case.1.SC1**

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

**Apply**

Your model should look like the one shown below.



1. 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.



- 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.

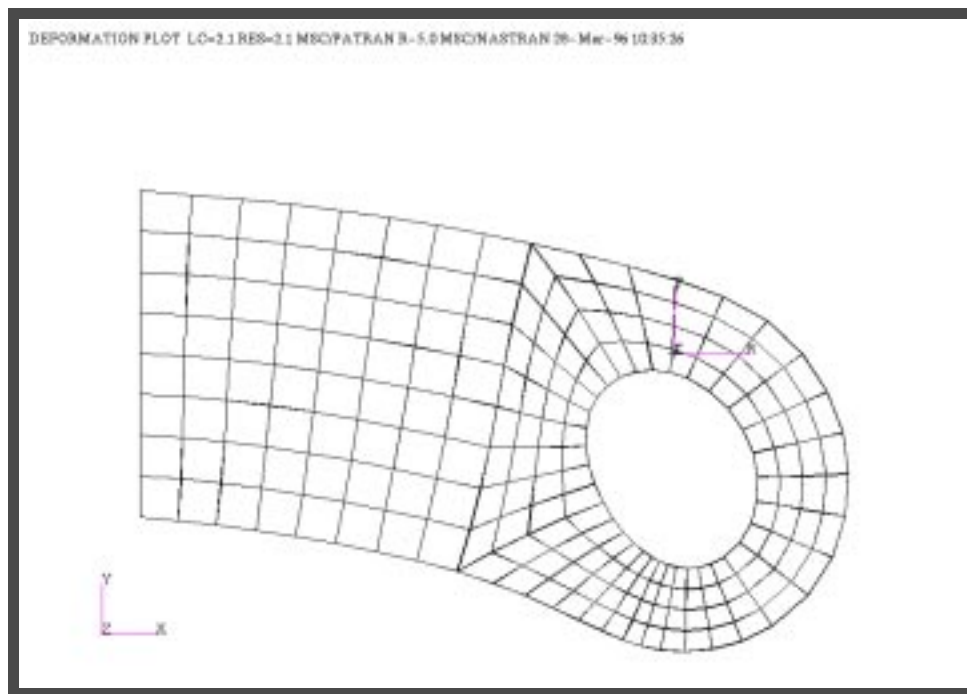


*Scale Factor:*

**0.25**

**Apply**

Your model should look like the one shown below.



## Create a Fringe Plot

- 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*

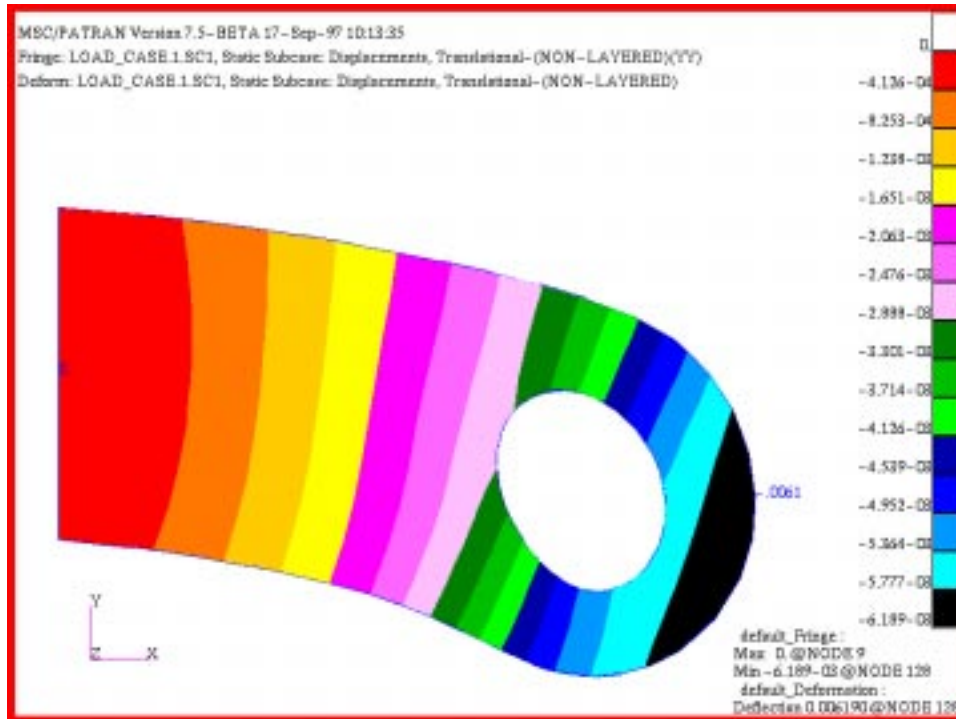
**Y-Component**

*Select Deformation Result*

**Displacements, Translational**

**Apply**

The fringe plot of the displacements is shown below.



Next, turn on the display of Finite Element Edges located under the Fringe Attributes button.



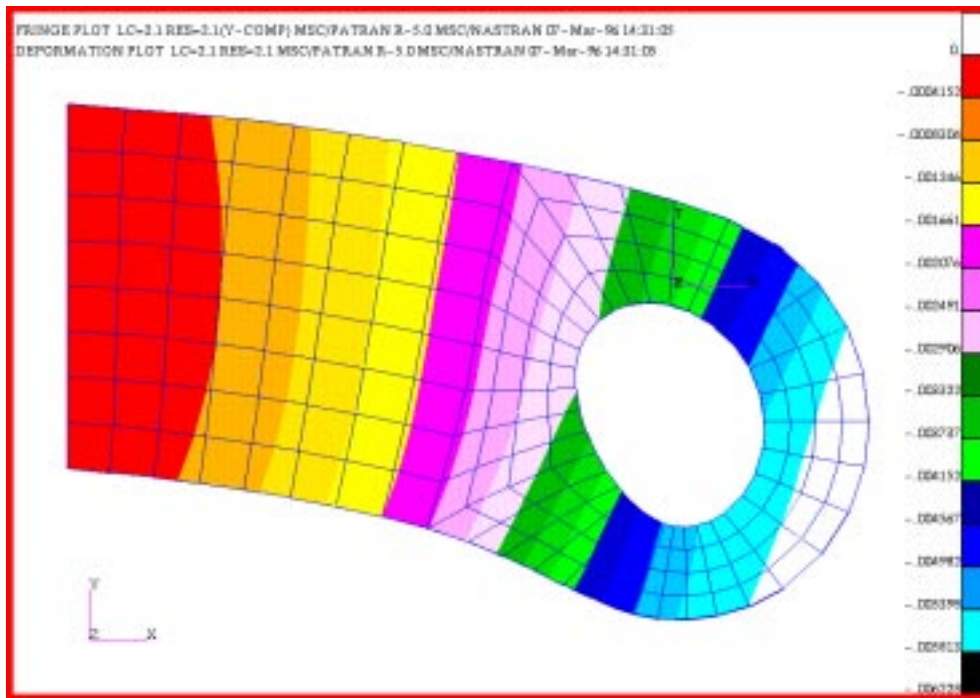
*Display:*

**Element Edges**

**Apply**

**Turn on  
Finite  
Element  
Edges**

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



- Produce a vector plot of the y-component of the displacements superimposed on the fringe plot of the clevis model. Use a **Constant-Model 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:*

*Object:*

*Existing Plot Types:*

5. Adjust the vectors attributes and scale.

*Action:*

*Object:*

*Method:*

*Show as:*

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 using a *Constant, Model Scaled Length*. Change view to **iso 1 view**.

6. Click on the Display Attributes.



**Constant**

Vector definition

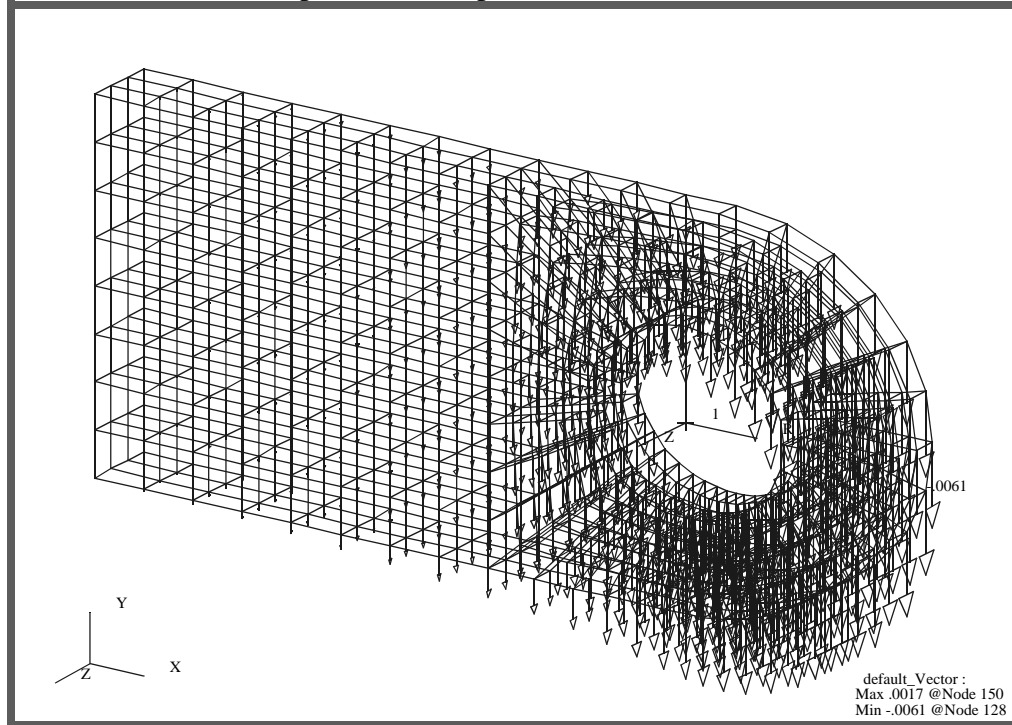
*Length:*

*Anchor Style:*

**Show Vector Label**

**Show on Deformed**

The vector plot of the displacements is shown below in Iso 1 View.



## 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...**

