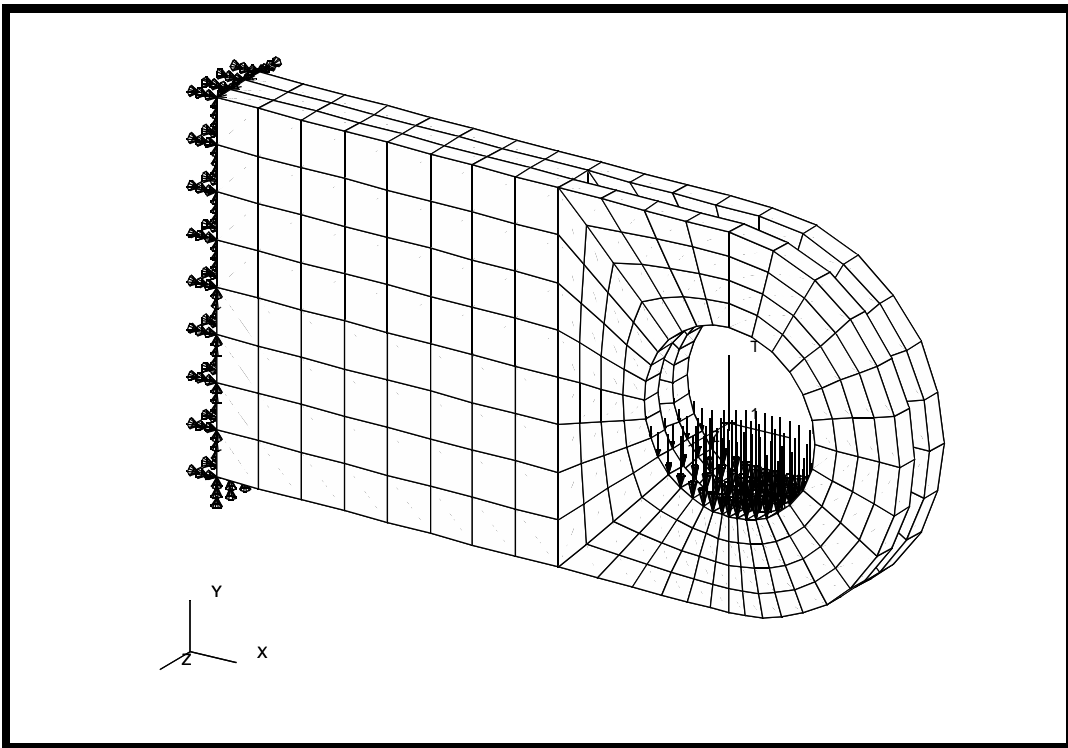

WORKSHOP 3

Loads and Boundary Conditions on a 3-D Clevis



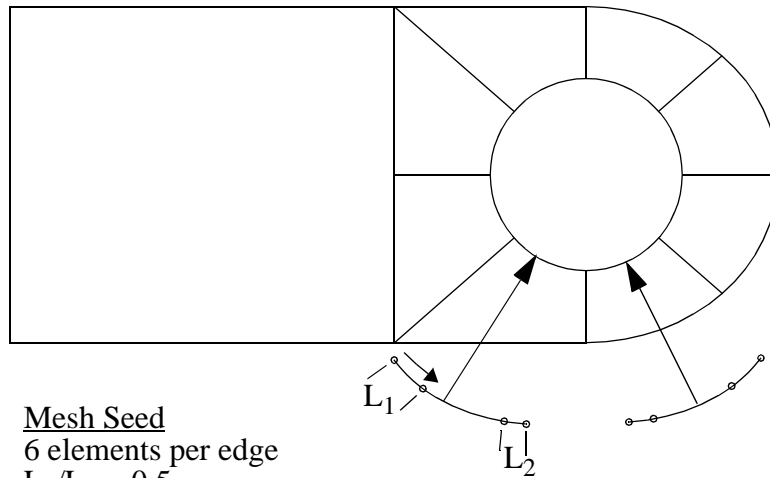
Objectives:

- Apply constraints to your model.
- Create and apply a field to describe a spatially varying load.



Model Description:

In this exercise you will define a finite element mesh for the Clevis model you developed earlier. You will use mesh seeding to create a refined mesh with a higher mesh density near the bottom of the hole where you will apply a force load in a future exercise.



Mesh Seed
6 elements per edge
 $L_2/L_1 = 0.5$

Finite Element Mesh
Global Edge Length = 0.5
HEX8 elements

Figure 3-1

Exercise Procedure:

1. Open up the database named **clevis.db**.

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

File/Open ...

Database List:

clevis.db

OK

2. Create the field **quadratic_load**, which will be used to define a spatially varying load.

◆ **Fields**

<i>Action:</i>	Create
<i>Object:</i>	Spatial
<i>Method:</i>	PCL Function
<i>Field Name:</i>	quadratic_load
<i>Field Type:</i>	◆ Vector
<i>Second Component:</i>	-100*(1-'X**2)
Apply	

3. Create a boundary condition such that the left edge of the clevis is rigidly fixed.

◆ **Loads/BCs**

<i>Action:</i>	Create
<i>Object:</i>	Displacement
<i>Method:</i>	Nodal
<i>New Set Name:</i>	clamped
Input Data ...	
<i>Translations:</i>	<0, 0, 0>
<i>Rotations:</i>	<0, 0, 0>
OK	
Select Application Region...	

In order to make applying boundary conditions and loads easier, change the view by selecting the following icon from the toolbar:



Front View

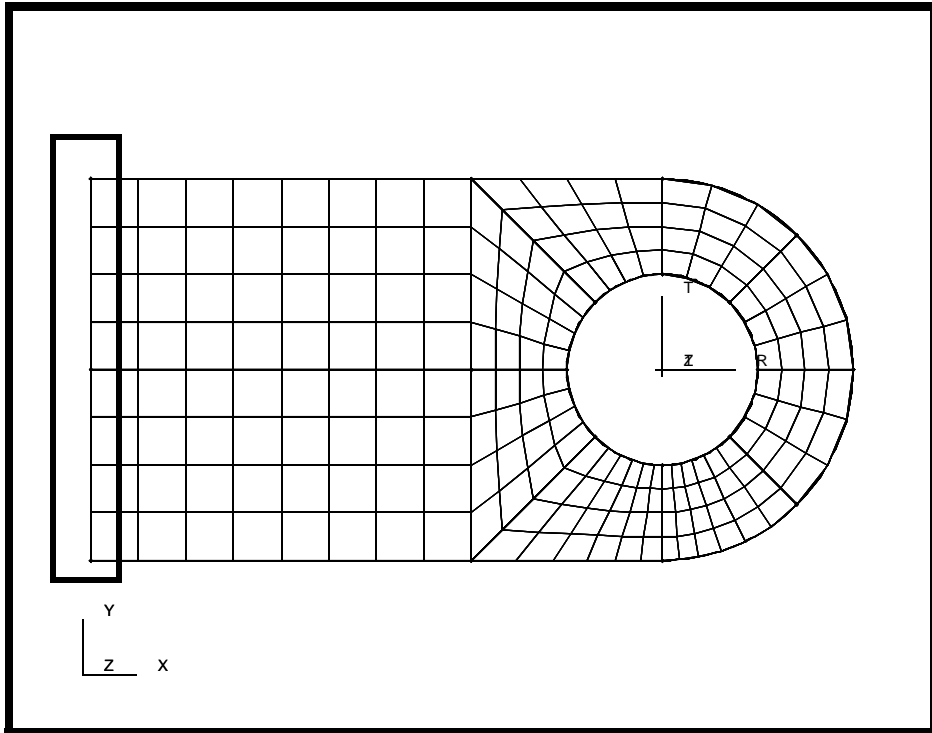
Geometry Filter: ◆ **Geometry**

In order to select the left face of the clevis model, you will need to use the following entity select icon:



Surface or Face

Figure 3.1 - Region to select for 'clamped' LBC



Select Geometric Entities:

select the left side of the clevis

Add
OK
Apply

4. Now create the quadratic load at the clevis hole.

Action:

Create

Object:

Force

Method:

Nodal

New Set Name:

vertical_load

Input Data ...

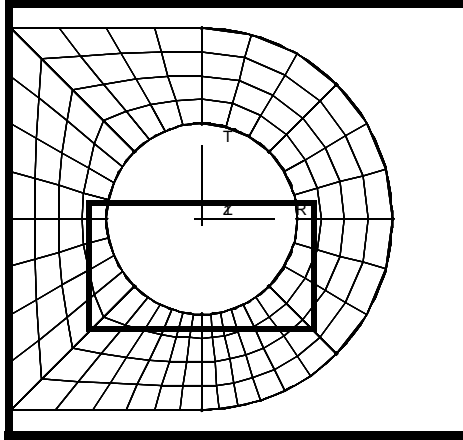
Force <F1 F2 F3>:

quadratic_load

OK

Select Application Region...

Figure 3.2 - Faces to Apply 'vertical load' to



Select Geometric Entities:

select faces on bottom half of hole (Figure 3.2)

Add

OK

Apply

5. Represent the quadratic load with scaled vectors instead of standard vectors with value labels.

Display / Load/BC/Elem. Props...

Vectors/Filters ...

Length:

◆ Scaled Model Relative

Show LBC/El. Prop. Values

Apply

Cancel

■ Show on FEM only

Apply

Cancel

For now, the Loads/BCs have disappeared. Redisplay them by using the **Plot Markers** command.

Action:

Plot Markers

Assigned Load/BC Sets:

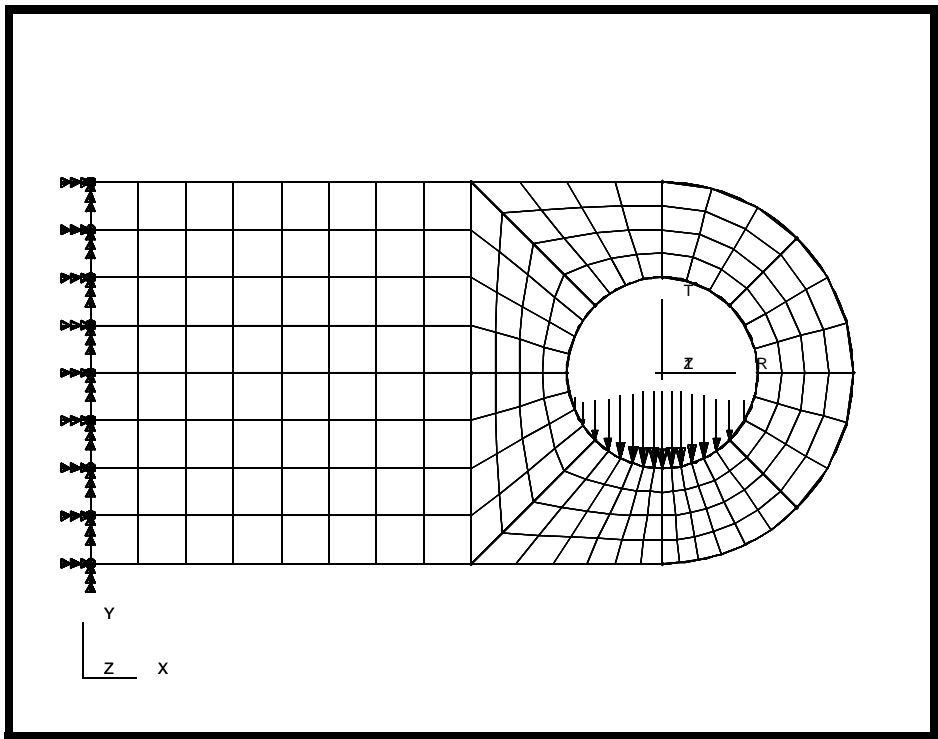
Displ_clamped
Force_vertical_load

Select Groups:

default_group

Apply

Figure 3.3 - Lug with Scaled LBC vectors



When done viewing, close the database.

File/Close

This ends the exercise.

