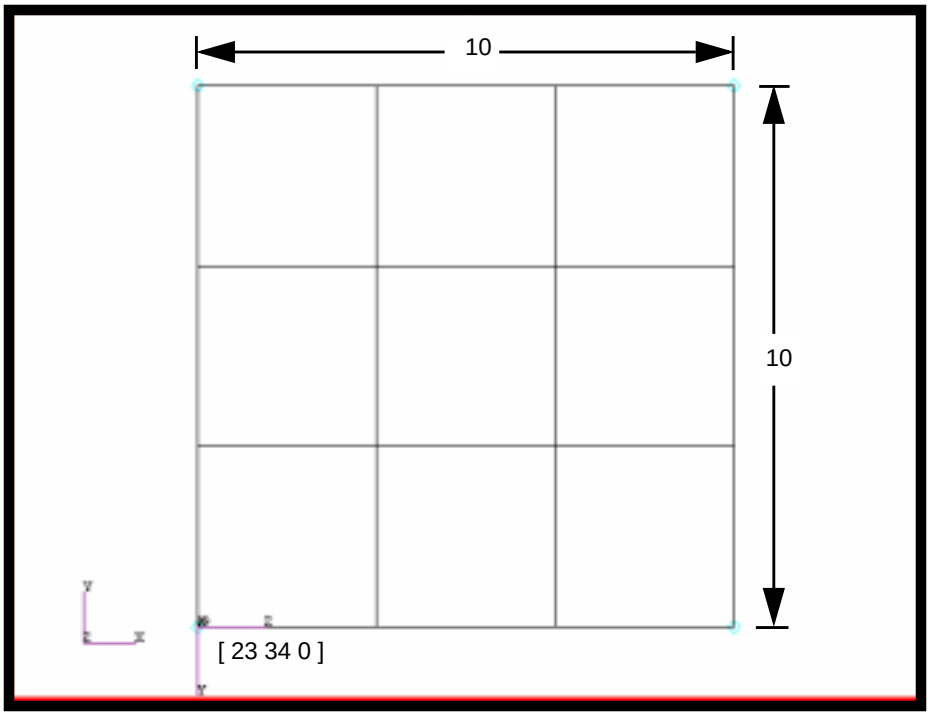
WORKSHOP 4

Creating Alternate Coordinate Frames



Objectives:

- Create a geometric representation of a plate using a basic coordinate system as the reference and analysis coordinate system..
- Create a local coordinate system.
- Create a NASTRAN input deck and examine GRID entries in the file.
- Delete mesh and repeat using local coordinate system as analysis coordinate system.
- Repeat, but modify the analysis coordinate system of the grid to local coordinate system.

Model Description:

In this exercise, you will mesh a simple plate geometry with a global edge length of 4 using the dimensions as shown in Figure 4.1 and the properties as shown in Table 4.1 below. First you will create the plate in the Basic Coordinate system and write out a NASTRAN deck to examine the GRID entries in the file. Then create a local coordinate system at [23 34 0]. You will delete the previously created mesh and use the new local coordinate system as the reference system and the Basic Coordinate system as the analysis coordinate system. Then examine the NASTRAN deck. Instead of deleting the mesh, modify the coordinate system of the grid to the new local coordinate system. Create the NASTRAN deck and examine the GRID entries in the file

Figure 4.1 - Plate Geometry.

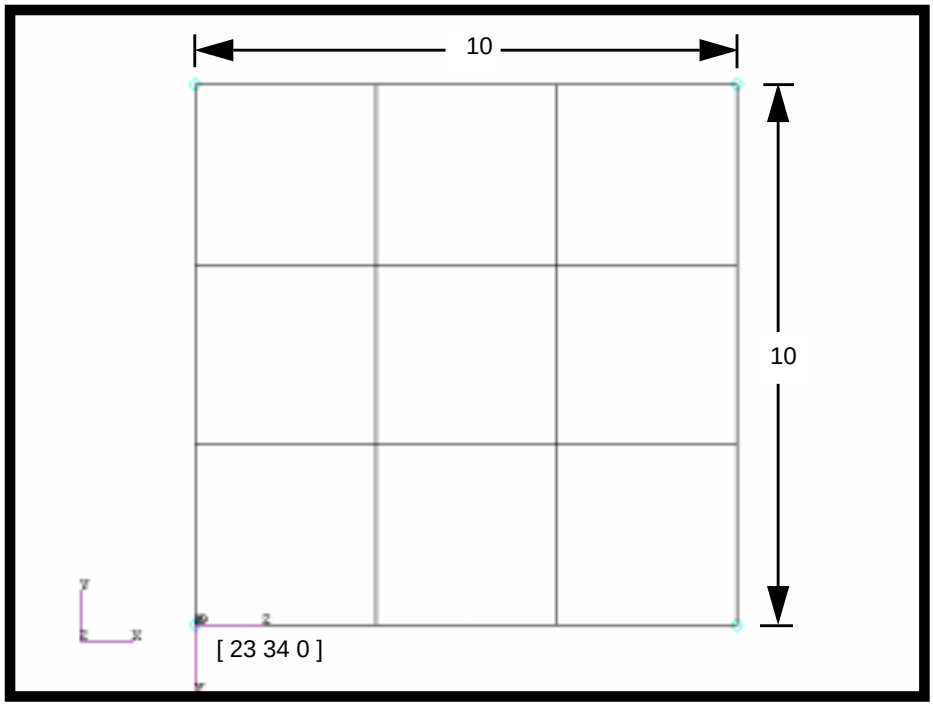


Table 4.1 -Material Properties

Elastic Modulus:	**10E6 psi**
Poisson Ratio:	**0.3**
Density:	**0.101 lbs/in^3**
Plate Thickness:	**0.1 in**

Exercise Procedure:

1. Start up MSC/NASTRAN for Windows V3.0 and begin to create a new model.

Double click on the icon labeled **MSC/NASTRAN for Windows V3.0**.

On the *Open Model File* form, select **New Model.**

Open Model File:	**New Model**

2. Create a material called **mat_1**.

From the pulldown menu, select **Model/Material.**

Model/Material...

Title:	**mat_1**
Young's Modulus:	**10e6**
Poisson's Ratio:	**0.3**
Mass Density:	**0.101**

OK

Cancel

3. Create a property called **plate** to apply to the members of the plate itself.

From the pulldown menu, select **Model/Property**.

Model/Property...

Title:	**plate**

To select the material, click on the **List** icon next to the databox and select **mat_1**.

Material:	**1..mat_1**
Thickness, Tavg or T1:	**0.1**

OK

Cancel

4. Create a local coordinate system.

Model/Coord Sys...

ID:	**99**
Title:	**local_coord**
Ref CSys:	**0..Basic Rectangular**
Method:	● **XY Locate**

OK

X:	*Y:*	*Z:*	
23	**34**	**0**	**OK**
24	**34**	**0**	**OK**
23	**34**	**1**	**OK**

Cancel

5. Create the NASTRAN geometry for the plate. Use the Basic Rectangular coordinate system as the reference and analysis coordinate systems.

Mesh/Between...

CSys:	**0..Basic Rectangular**
Property:	**1..plate**
Mesh Size/ #Nodes/ Dir 1:	**4**
Mesh Size/ #Nodes/ Dir 2:	**4**

OK

	X:	*Y:*	*Z:*
Corner 1:	**23**	**34**	**0**

OK

Repeat this process for the other 3 corners.

X:	*Y:*	*Z:*	
33	**34**	**0**	**OK**
33	**44**	**0**	**OK**
23	**44**	**0**	**OK**

To fit the display onto the screen, use the **Autoscale** feature.

View/Autoscale

6. Create the model constraints.

Even though you will not be analyzing this model, you will need to create a dummy constraint. Do this just by arbitrarily naming a contraint set.

Model/Constraint/Set...

Title: **constraint**

OK

7. Create the model loading.

This will be a dummy load set.

Model/Load/Set...

Title: **load**

OK

8. Create the NASTRAN input file.

File/Export/Analysis Model...

Analysis Format/Type: **1..Static**

OK

Change the directory to **C:\temp**.

File Name: **basic**

Write

OK

The translation has created a NASTRAN input deck called **basic.dat**. Go to the **C:\temp** directory and open this file using Windows Notepad. Examine the GRID cards in the file. It should look similar to what is shown below.

```
GRID            1       0     23.     34.      0.       0
GRID            2       0 26.3333     34.      0.       0
GRID            3       0 29.6667     34.      0.       0
GRID            4       0     33.     34.      0.       0
GRID            5       0     23. 37.3333      0.       0
GRID            6       0 26.3333 37.3333      0.       0
GRID            7       0 29.6667 37.3333      0.       0
GRID            8       0     33. 37.3333      0.       0
GRID            9       0     23. 40.6667      0.       0
GRID           10       0 26.3333 40.6667      0.       0
GRID           11       0 29.6667 40.6667      0.       0
GRID           12       0     33. 40.6667      0.       0
GRID           13       0     23.     44.      0.       0
GRID           14       0 26.3333     44.      0.       0
GRID           15       0 29.6667     44.      0.       0
GRID           16       0     33.     44.      0.       0
```

9. Save your model in the **C:\temp**.

File/Save As...

File Name: **model1**

Save

10. Now delete the mesh and remesh the surface using the **local_coord** (ID 99) as the reference system and the Basic Rectangular system as the analysis coordinate system.

First delete the elements.

Delete/Model/Element...

Select All

OK

Answer **Yes** when asked “OK to Delete 9 Selected Element(s)?”.

Yes

Now delete the nodes.

Delete/Model/Node...

Select All
OK

Answer **Yes** when asked “OK to Delete 16 Selected Node(s)?”.

Yes

Refresh your display.

View/Regenerate

Fit your display.

View/Autoscale

11. Now create a new mesh on the local coordinate system (ID 99).

Mesh/Between...

CSys:	**99..local_coord**
Property:	**1..plate**
Mesh Size/ #Nodes/ Dir 1:	**4**
Mesh Size/ #Nodes/ Dir 2:	**4**

OK

	X:	*Y:*	*Z:*
Corner 1:	**0**	**0**	**0**

OK

Repeat this process for the other 3 corners.

X:	*Y:*	*Z:*	
0	**10**	**0**	**OK**
0	**10**	**10**	**OK**

X:	*Y:*	*Z:*	
0	**0**	**10**	**OK**

To fit the display onto the screen, use the **Autoscale** feature.

View/Autoscale

Rotate your model.

View/Rotate...

YZ Right

OK

12. Create the NASTRAN input file.

File/Export/Analysis Model...

Analysis Format/Type: **1..Static**

OK

Change the directory to **C:\temp**.

File Name: **coord_99**

Write

OK

The translation has created a NASTRAN input deck called **coord_99.dat**. Go to the **C:\temp** directory and open this file using Windows Notepad. Examine the GRID cards in the file. It should look similar to what is shown on the next page. (Note: Although Grids 1-16 have been deleted, MSC/N4W will continue to name subsequent nodes from the last known number. This will not affect the objective of this exercise).

```
GRID          17      99      0.      0.      0.       0
GRID          18      99      0. 3.33333      0.       0
GRID          19      99      0. 6.66667      0.       0
GRID          20      99      0.     10.      0.       0
GRID          21      99      0.      0. 3.33333      0
GRID          22      99      0. 3.33333 3.33333      0
GRID          23      99      0. 6.66667 3.33333      0
GRID          24      99      0.     10. 3.33333      0
GRID          25      99      0.      0. 6.66667      0
GRID          26      99      0. 3.33333 6.66667      0
GRID          27      99      0. 6.66667 6.66667      0
GRID          28      99      0.     10. 6.66667      0
GRID          29      99      0.      0.     10.      0
GRID          30      99      0. 3.33333     10.      0
GRID          31      99      0. 6.66667     10.      0
GRID          32      99      0.     10.     10.      0
```

13. Now, instead of deleting the mesh, modify the analysis coordinate system of the grid to the **local_coord** (ID 99).

Open the previously saved model.

File/Open...

File Name: **model1**

Open

Answer **No** when asked to save the current file before closing.

No

Modify/Update Other/Output CSys...

Select All

OK

Entity ID: **99..local_coord**

OK

14. Create the NASTRAN input file.

File/Export/Analysis Model...

Analysis Format/Type: **1..Static**

OK

Change the directory to **C:\temp**.

File Name: **ana_coord**

Write

OK

The translation has created a NASTRAN input deck called **ana_coord.dat**. Go to the **C:\temp** directory and open this file using Windows Notepad. Examine the GRID cards in the file. It should look similar to what is shown below.

```
GRID          1       0     23.     34.      0.      99
GRID          2       0 26.3333     34.      0.      99
GRID          3       0 29.6667     34.      0.      99
GRID          4       0     33.     34.      0.      99
GRID          5       0     23. 37.3333      0.      99
GRID          6       0 26.3333 37.3333      0.      99
GRID          7       0 29.6667 37.3333      0.      99
GRID          8       0     33. 37.3333      0.      99
GRID          9       0     23. 40.6667      0.      99
GRID         10       0 26.3333 40.6667      0.      99
GRID         11       0 29.6667 40.6667      0.      99
GRID         12       0     33. 40.6667      0.      99
GRID         13       0     23.     44.      0.      99
GRID         14       0 26.3333     44.      0.      99
GRID         15       0 29.6667     44.      0.      99
GRID         16       0     33.     44.      0.      99
```

This concludes this exercise.