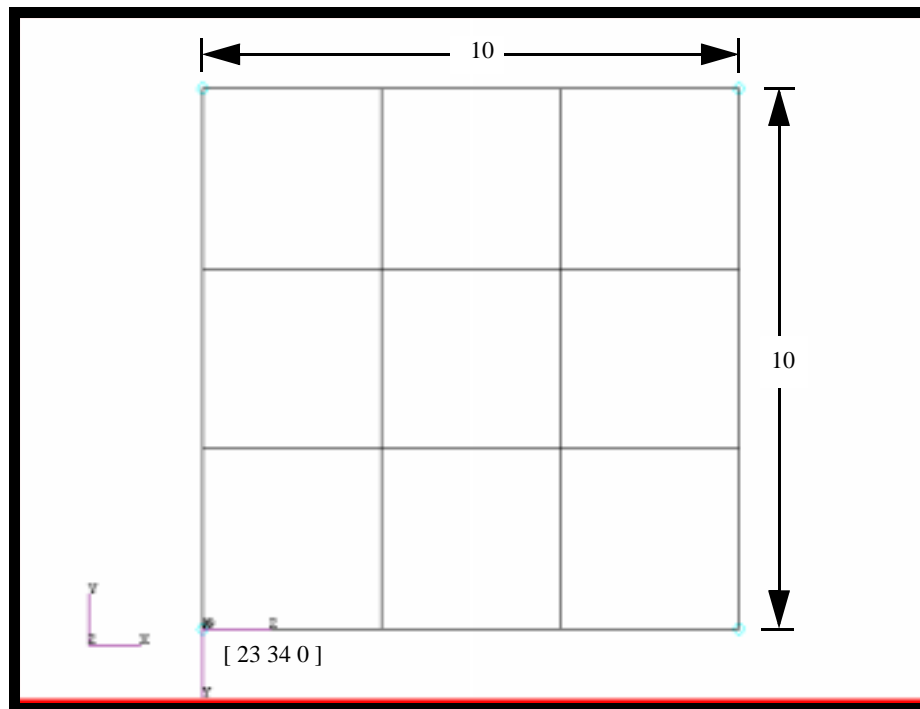


WORKSHOP 15

Creating Alternate Coordinate System



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.
- Re-mesh using a local coordinate system as the analysis coordinate system.
- Repeat, but modify the analysis coordinate system of the grid to a local coordinate system.

Model Description:

In this exercise, you will explore the difference between the reference coordinate system (node definition CSys), and the analysis coordinate system (Output CSys).

These coordinate systems are defined on the MSC.Nastran Grid card.

Figure 15.1 - Plate Geometry

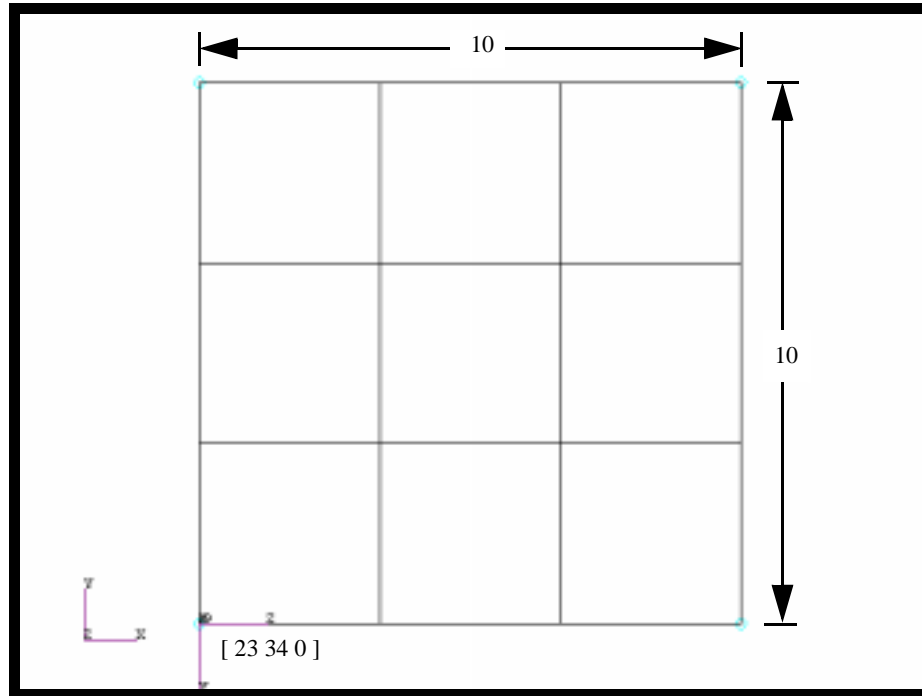


Table 15.1 -Material Properties

Youngs Modulus:	10E+06 psi
Poisson's Ratio:	0.3
Density:	0.101 lbs/in³
Plate Thickness:	0.1 in

Exercise Procedure:

1. Start up MSC.Nastran for Windows V4.0 and begin to create a new model.

Double click on the icon labeled **MSC.Nastran for Windows V4.0**.

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

Youngs 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:

Title:

Ref CSys:

Method: ZX Locate

X:	Y:	Z:	
<input type="text" value="23"/>	<input type="text" value="34"/>	<input type="text" value="0"/>	<input type="text" value="OK"/>
<input type="text" value="24"/>	<input type="text" value="34"/>	<input type="text" value="0"/>	<input type="text" value="OK"/>
<input type="text" value="23"/>	<input type="text" value="34"/>	<input type="text" value="1"/>	<input type="text" value="OK"/>

Autoscale the model.

View/Autoscale... <Ctrl+A>

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

NOTE: We are going to create the nodes and element explicitly.

Mesh/Between...

CSys:

Property:

Mesh Size/ #Nodes/ Dir 1:

Mesh Size/ #Nodes/ Dir 2:

X: Y: Z:

Corner 1:

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 <Ctrl+A>

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 constraint set.

Model/Constraint/Set...

Title:

7. Create the model loading.

This will be a dummy load set.

Model/Load/Set...

Title:

8. Create the MSC.Nastran input file.

File/Export/Analysis Model... <Ctrl+T>

Analysis Format/Type:

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

File Name:

basic

Write

OK

The translation has created a MSC.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.

		FIELD 3			FIELD 7	
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

Notice that Field 3 and Field 7 are zeros. The value of zero refers to the Basic Coordinate system in MSC.Nastran. Zero and blank both refer to the Basic Coordinate System.

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 (Node Definition CSys) and the Basic Rectangular system (Output CSys) 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

<Ctrl+G>

Fit your display.

View/Autoscale

<Ctrl+A>

11. Now create a new mesh using the local coordinate system (ID 99) as the Node Definition CSys.

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:

Repeat this process for the other 3 corners.

X:	Y:	Z:	
<input type="text" value="0"/>	<input type="text" value="10"/>	<input type="text" value="0"/>	<input type="text" value="OK"/>
<input type="text" value="0"/>	<input type="text" value="10"/>	<input type="text" value="10"/>	<input type="text" value="OK"/>
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="10"/>	<input type="text" value="OK"/>

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

View/Autoscale <Ctrl+A>

12. Create the MSC/NASTRAN input file.

File/Export/Analysis Model... <Ctrl+T>

Analysis Format/Type:

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

File Name:

The translation has created a MSC.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.

	FIELD 3			FIELD 7		
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

Notice that only Field 7 is changed to the local coordinate system. This coordinate system is called the Output Coordinate system because the displacement is reported in this coordinate system in the F06 file.

NOTE: The Node Definition Csys and the Output CSys DO NOT have to be the same value.

- 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

- Create the Nastran input file.

File/Export/Analysis Model... <Ctrl+T>

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 the exercise.

File/Save

File/Exit

