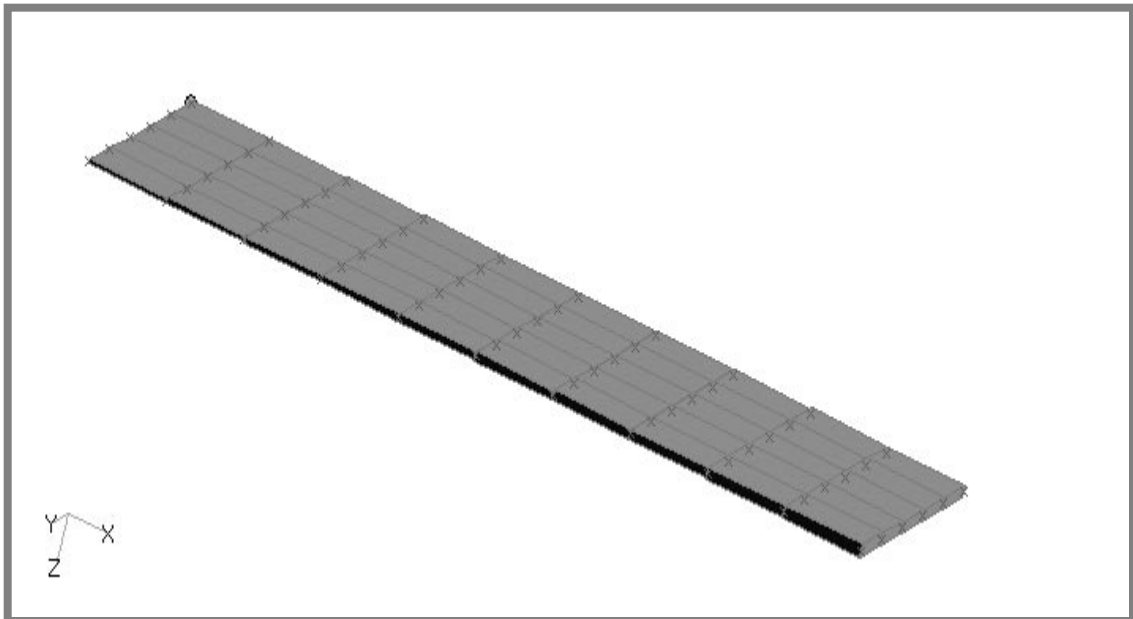# APPENDIX C

Varying Thickness-Stepped

Objectives:

■ Open an existing model with tapering thickness.

■ Change the thickness option to create a model with changing thickness in steps.

Model Description:

In this exercise, we will create a 30 in x 10 in plate with varying thickness. MSC/NASTRAN for Windows V3.0 will be used to create the varying thickness by inputting a function of 0.1+0.01x, where x is the x-coordinate of the Node ID. This exercise will create a stepped section for a plate.

Figure C.1 - Grid Coordinates and Element Connectivity
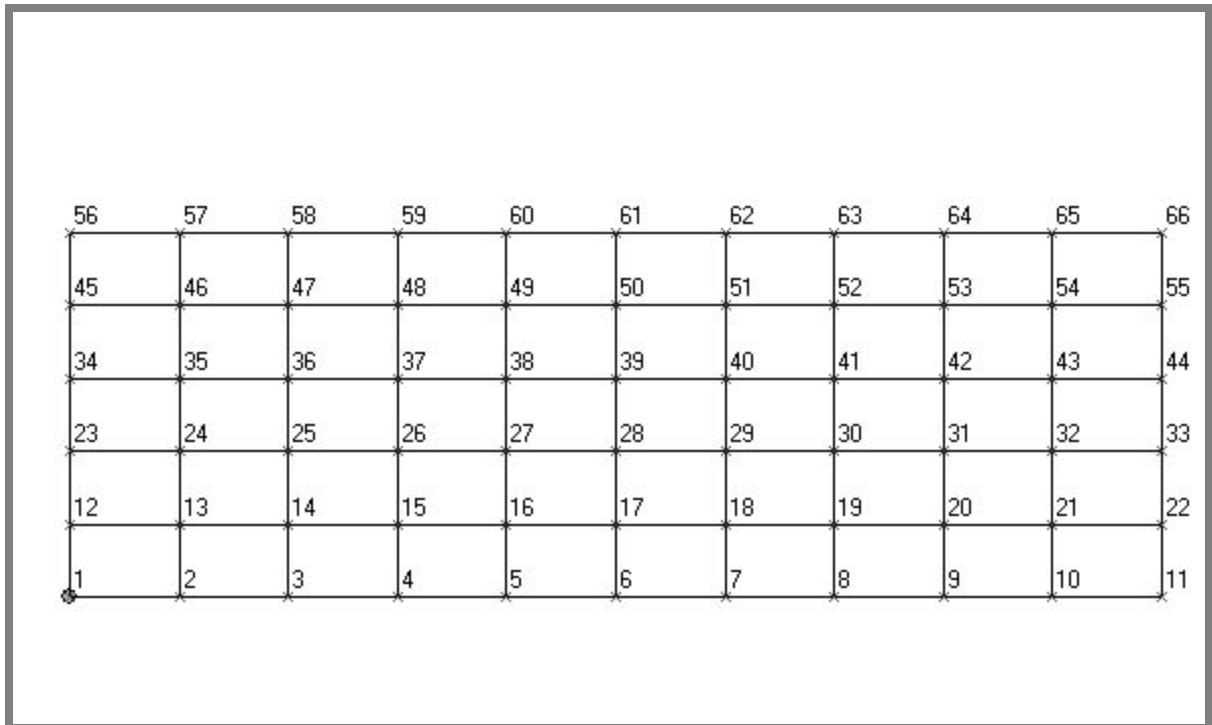
Table C.1 - Material Properties

Length (a)	**30 in**
Height (b)	**10 in**
Weight Density	**0.1 lb/in^3**
Youngs Modulus	**10E6 lb/in^2**
Poisson's Ratio	**0.3**

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, change to **c:\temp** directory and open the model from the previous exercise.

Open Model File: | **taper**

Open

2. Reapply the equation that will vary the thickness.

Modify/UpdateElements/Adjust Plate...

Select All

OK

Under *Method* input the following:

● **Equation or Constant**

ID Variable: | **i**

Value: | **0.1 + 0.01* XND(! i)**

Check the **Average for Each Element** box. This will make the thickness increase in steps.

☒ **Average for Each Element**

Under *Update* select the following:

● **Thickness**

OK

3. Regenerate the display.

View/Regenerate

As you can see, the thickness increases in steps.. In the NASTRAN bulk data file, the PSHELL card creates for stepped behavior.

4.   Write the NASTRAN bulk data file.

File/Export/Analysis Model...

OK

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

File Name: | step |

Write
OK

Save the model.

File/Save As...

File Name: | step |

Save

5.   View the NASTRAN bulk data file.

Minimize NASTRAN for Windows and open Notepad. Change to the **c:\temp** directory and open **taper.dat**. Your file will contain PSHELL cards like shown below which determine the varing thicknesses of the model.

```
PSHELL        1        1      0.1       1              1              0.

PSHELL        2        1      0.1       1              1              0.

PSHELL        3        1      0.13      1              1              0.

PSHELL        4        1      0.16      1              1              0.

PSHELL        5        1      0.19      1              1              0.

PSHELL        6        1      0.22      1              1              0.

PSHELL        7        1      0.25      1              1              0.
```

This concludes the exercise.