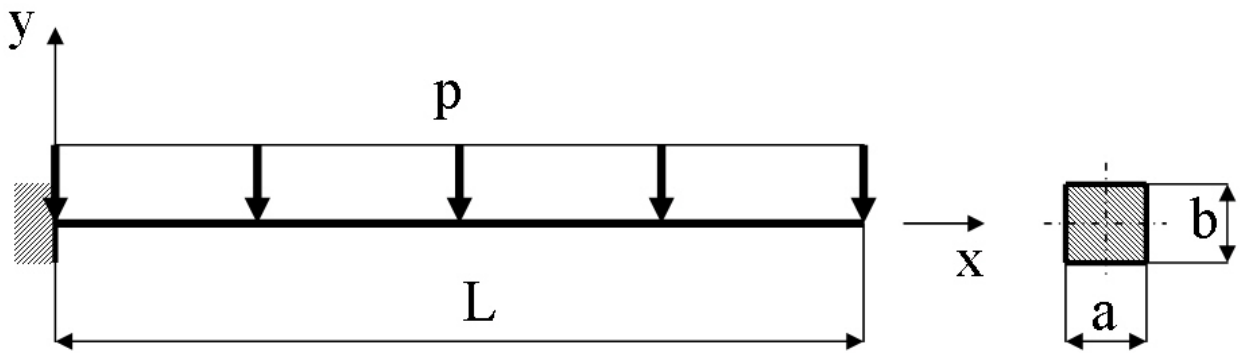
Course in ANSYS

Example0110

Example – Cantilever beam



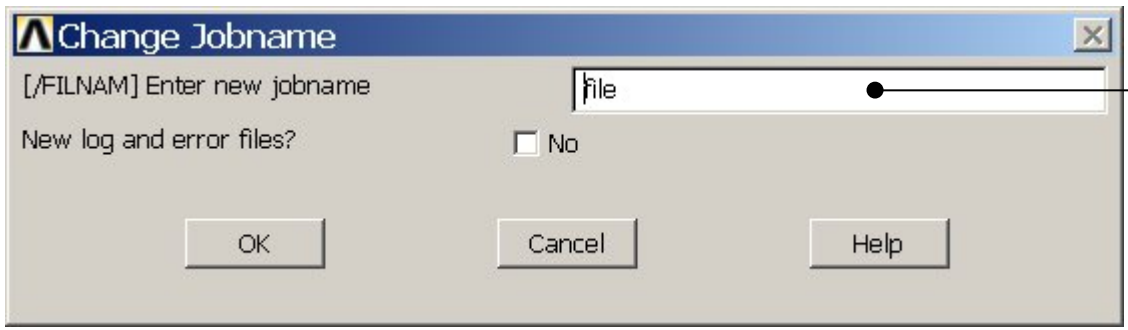
Objective:
Display the moment curve
Tasks:
Obtain values in intermediate points?
Create an element table?
Display the moment curve?
Topics:
Element type, pressure load, Element table/output, list

$E = 210000 N/mm^2$
$\nu = 0.3$
$L = 1000mm$
$a = 10mm$
$b = 10mm$
$p = 10N/mm$

Example - title

Utility Menu > File > Change Jobname — GUI

/jobname, Example0110 — Command line entry

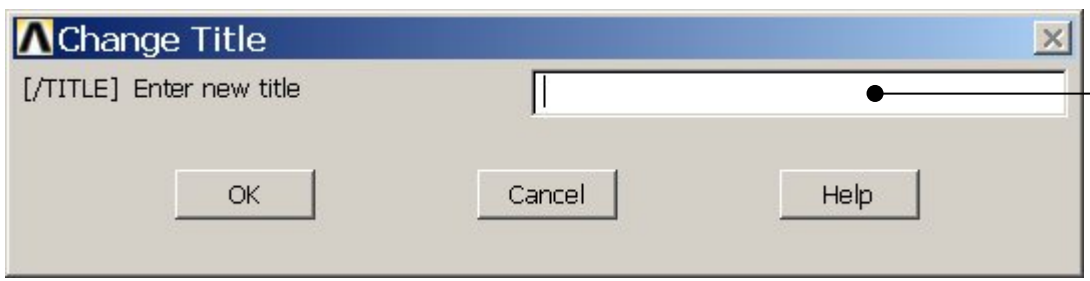


Enter: Example0110

Utility Menu > File > Change Title

/title, Cantilever beam

Enter: Cantilever beam



Example - Keypoints

Note: An empty # result in automatic numbering.

Preprocessor > Modeling > Create > Keypoints > In Active CS

/PREP7

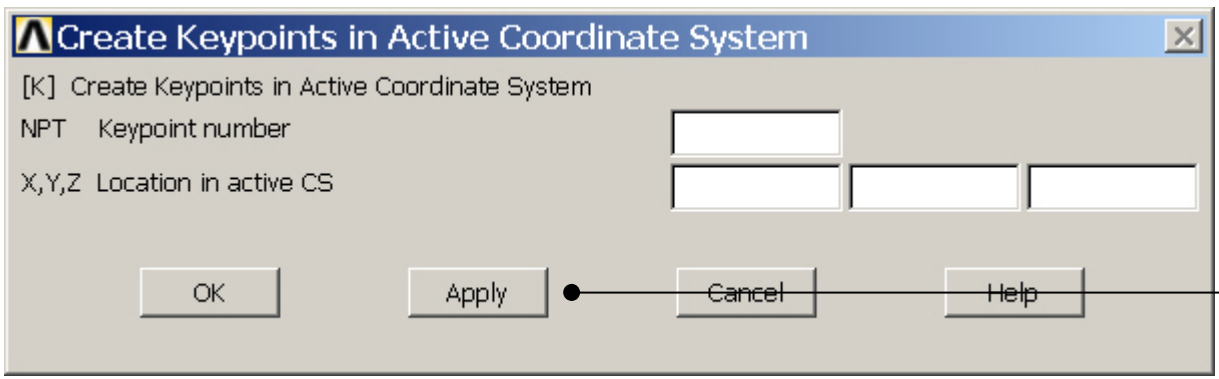
K,,,,

K,,100,,

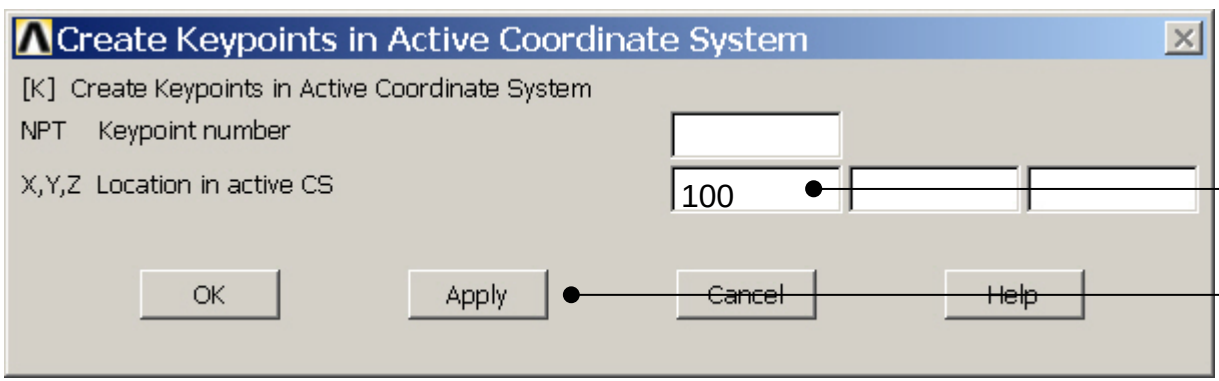
General format:

K,#,X,Y,Z

Keypoint number
X Keypoint x-coordinate
Y Keypoint y-coordinate
Z Keypoint z-coordinate



Press **Apply**



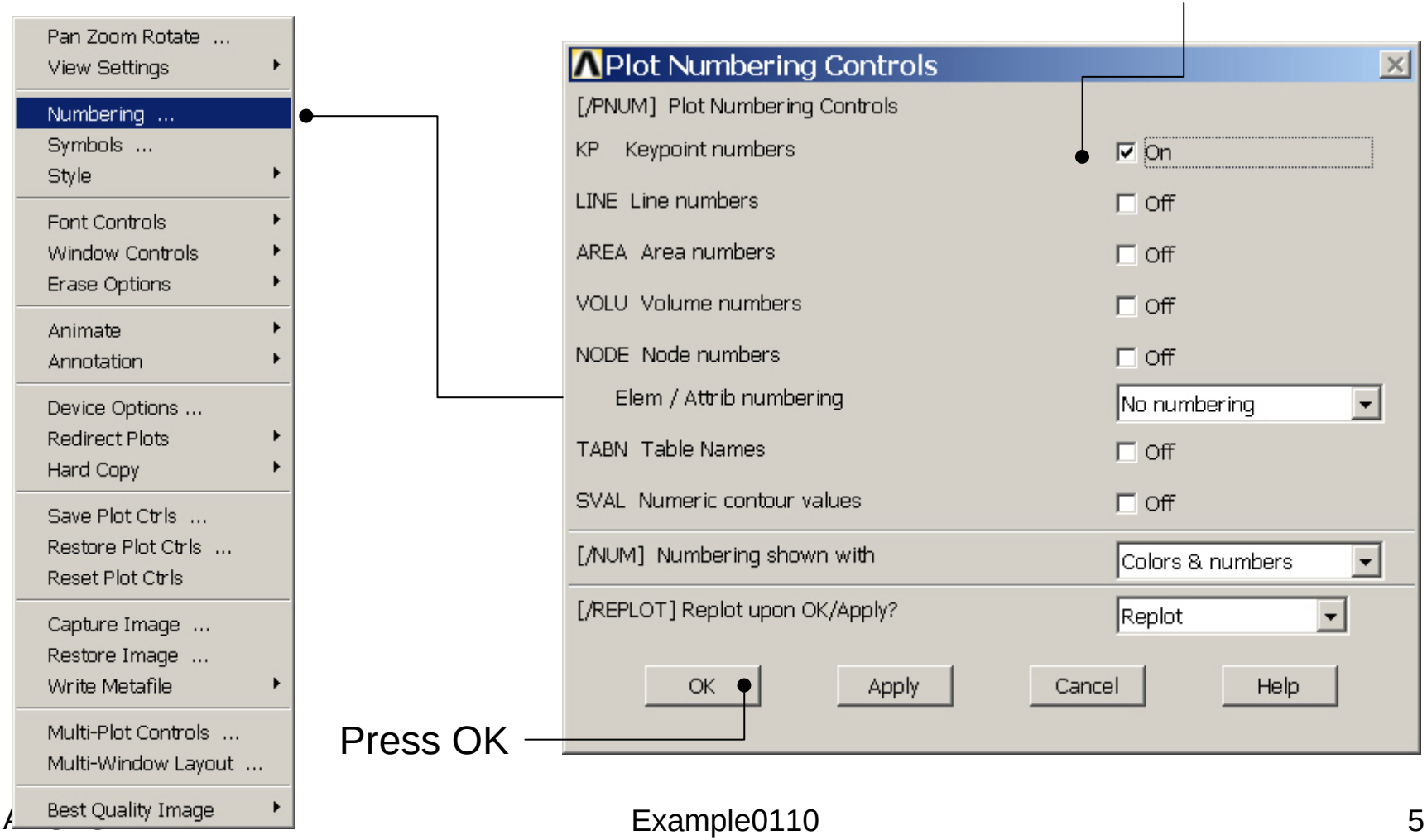
Enter 100 and
Press **Apply**

Note: An empty box result in a zero. It is allowed to enter 0.0 in each box.

Example - Numbering

Utility Menu > PlotCtrls > Numbering

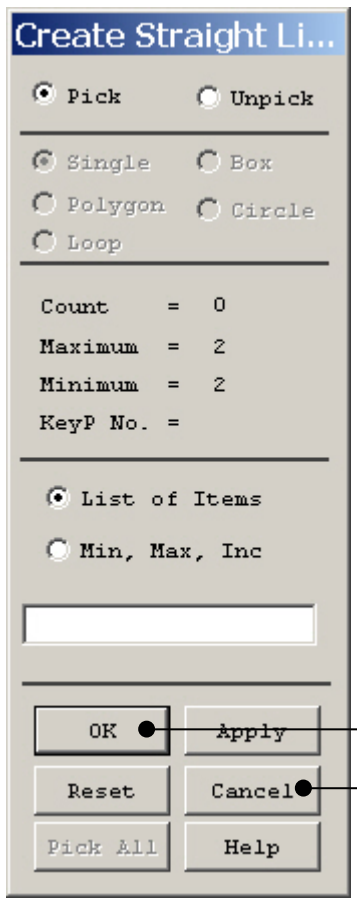
Switch on Keypoint numbers



Press OK

Example - Lines

Preprocessor > Modeling > Create > Lines > Lines > Straight Line
Create a line between Keypoint 1 and Keypoint 2.
L,1,2



HINT: By clicking with the right-hand mouse button you shift between the Pick/Unpick function. This is indicated by the direction of the cursor arrow:

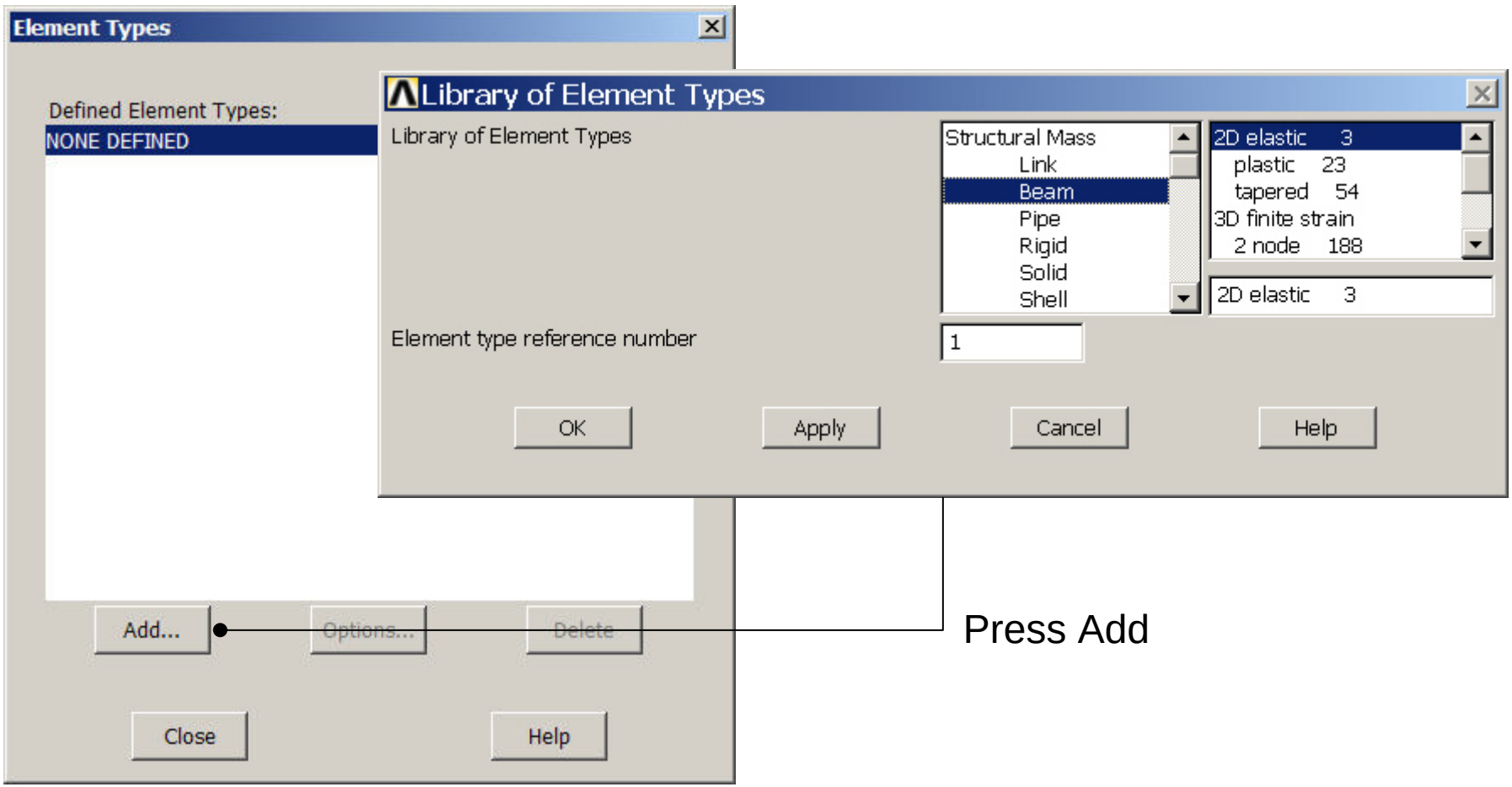
Pick: upward arrow

Unpick: downward arrow

Press OK or Cancel to finish selection

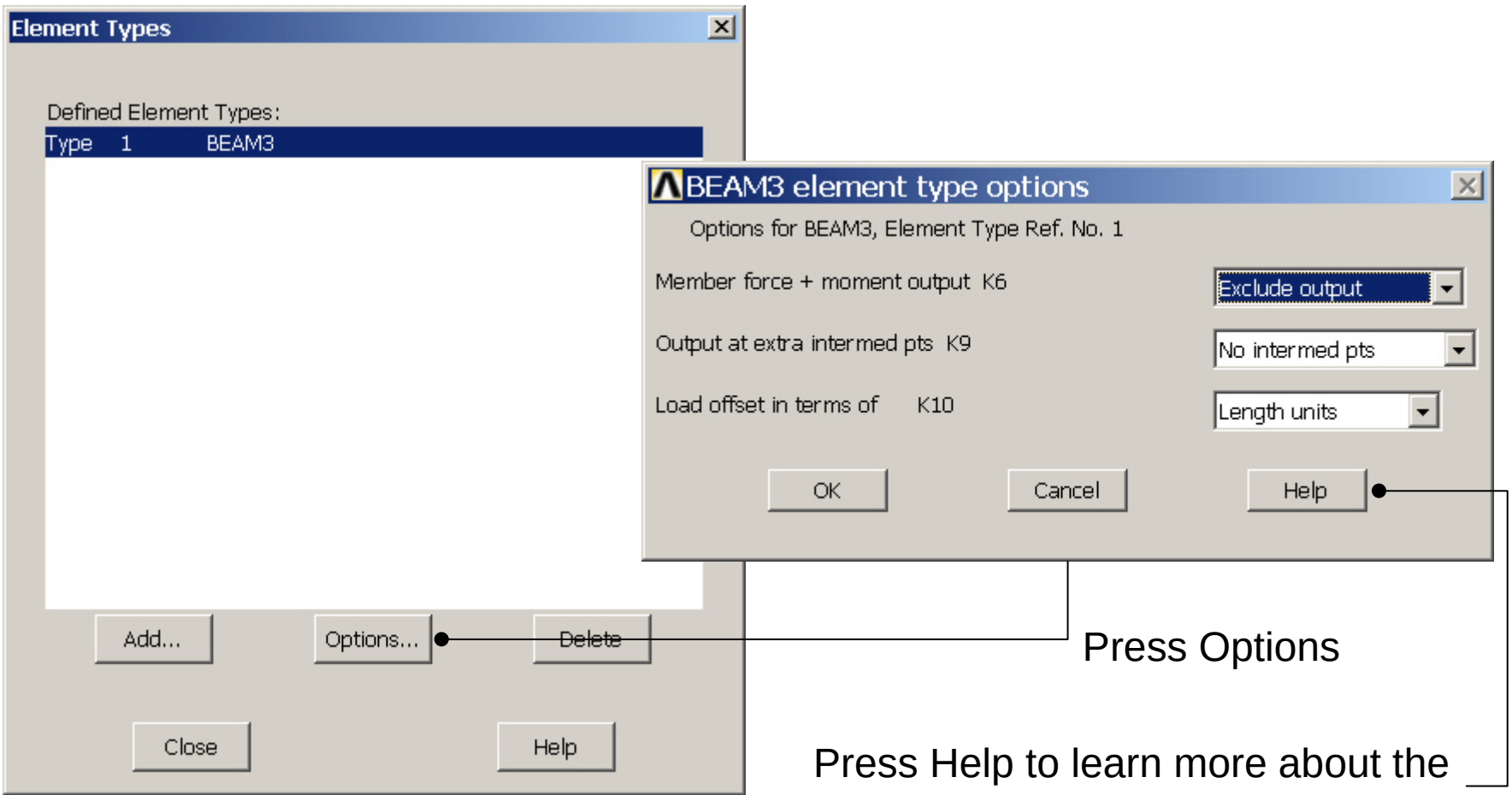
Example – Element Type

Preprocessor > Element Type > Add/Edit/Delete



Example - Element Type

Preprocessor > Element Type > Add/Edit/Delete

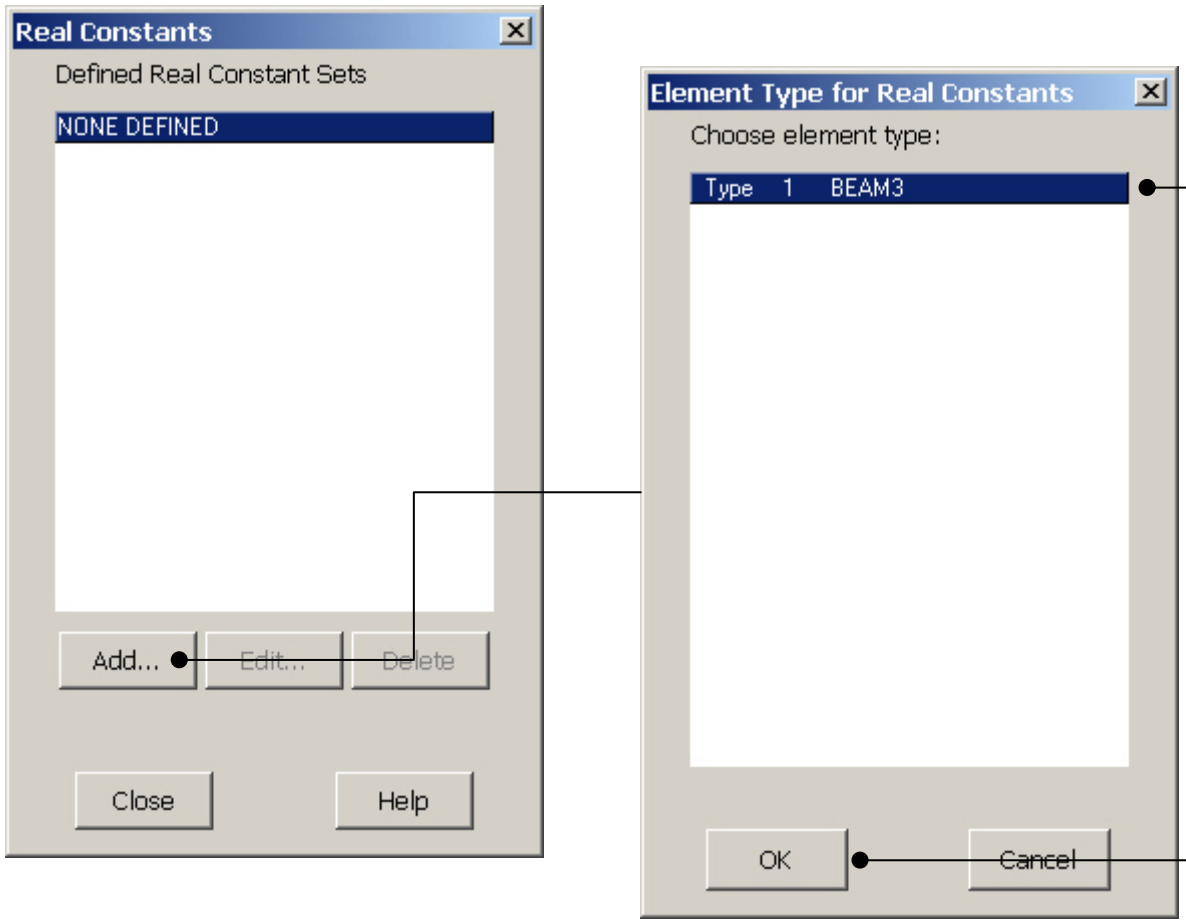


Press Options

Press Help to learn more about the element.

Example – Real Constants

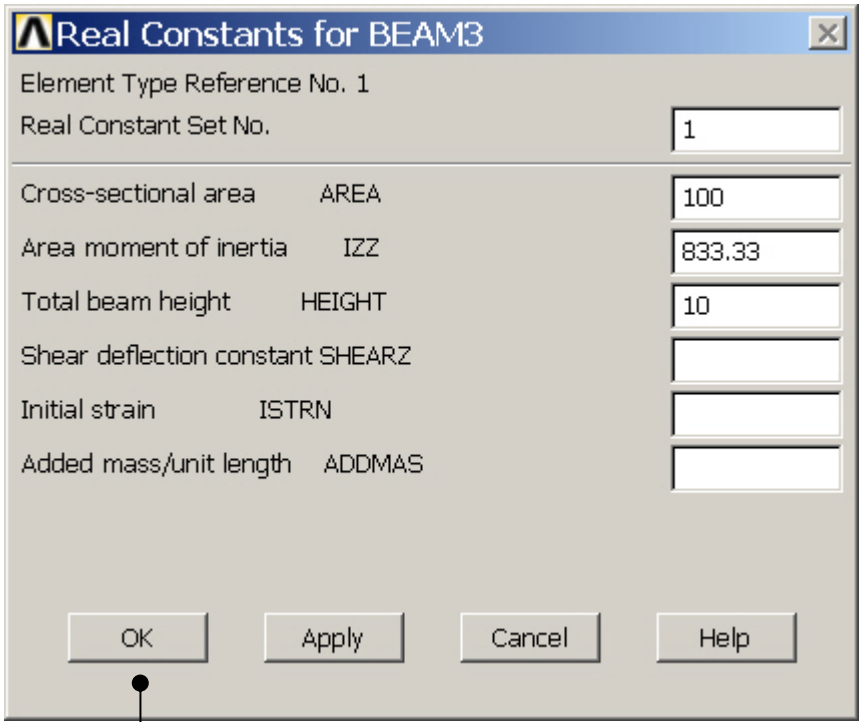
Preprocessor > Real Constants > Add

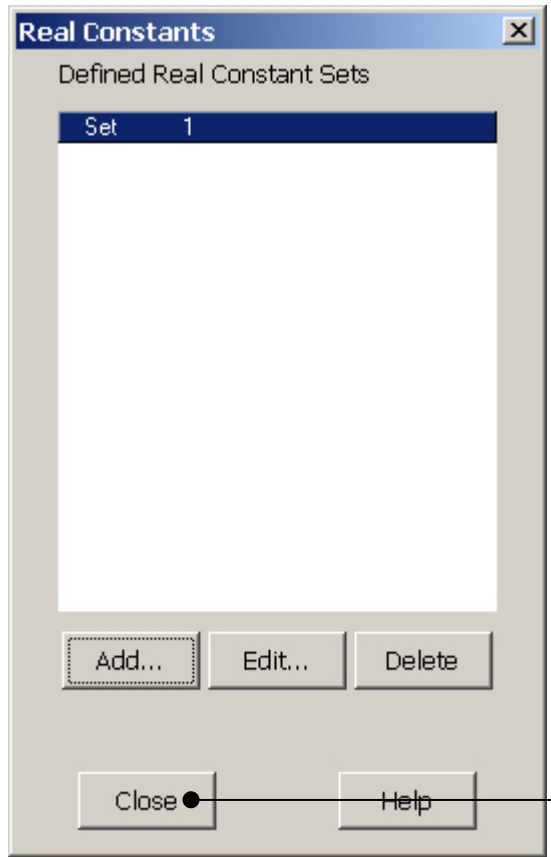


Place the cursor on the relevant element and press OK

Example - Real Constants

Preprocessor > Real Constants > Add



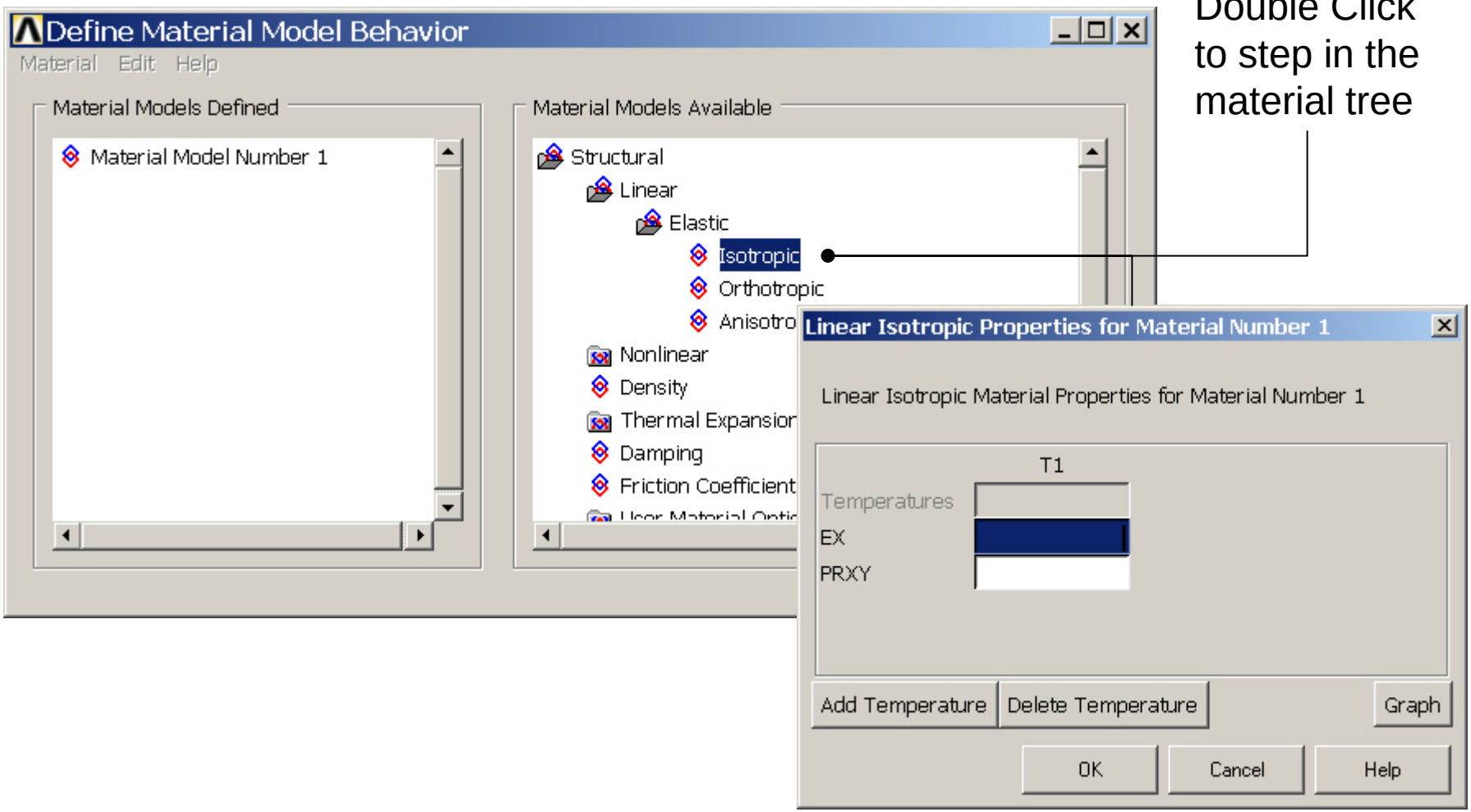


Press Close to finish

Press OK

Example - Material Properties

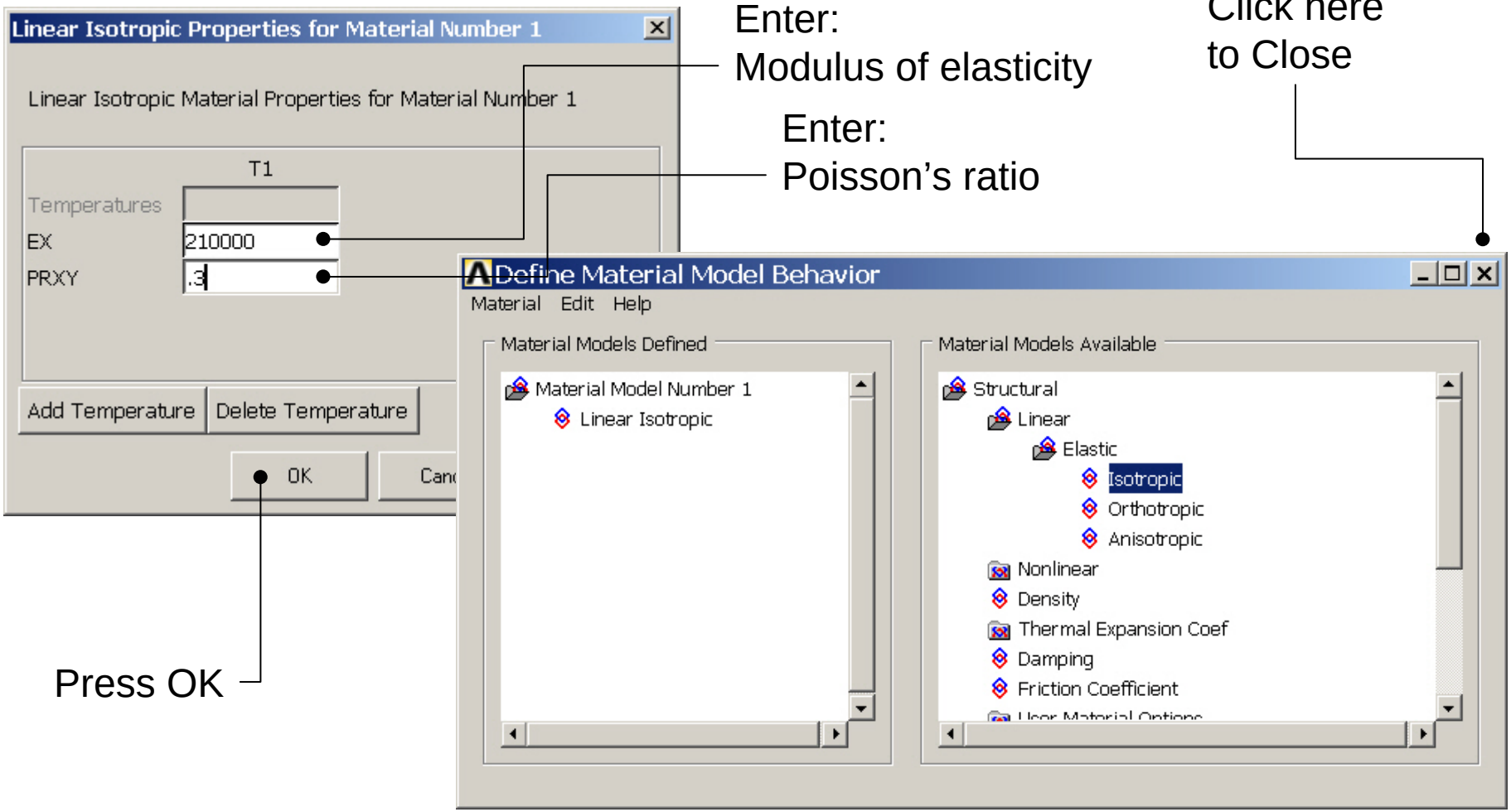
Preprocessor > Material Props > Material Models



Double Click to step in the material tree

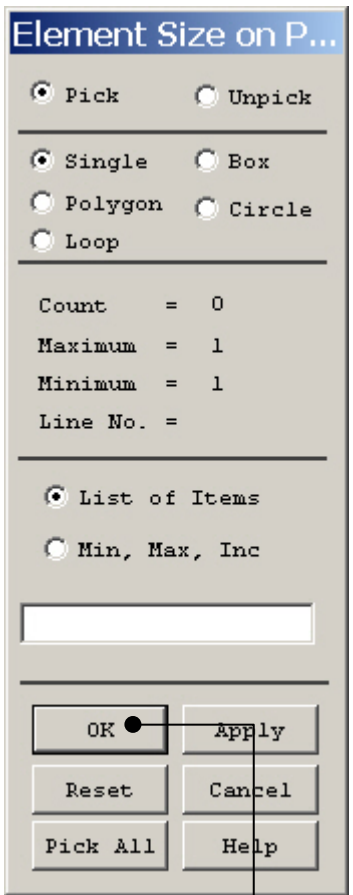
Example - Material Properties

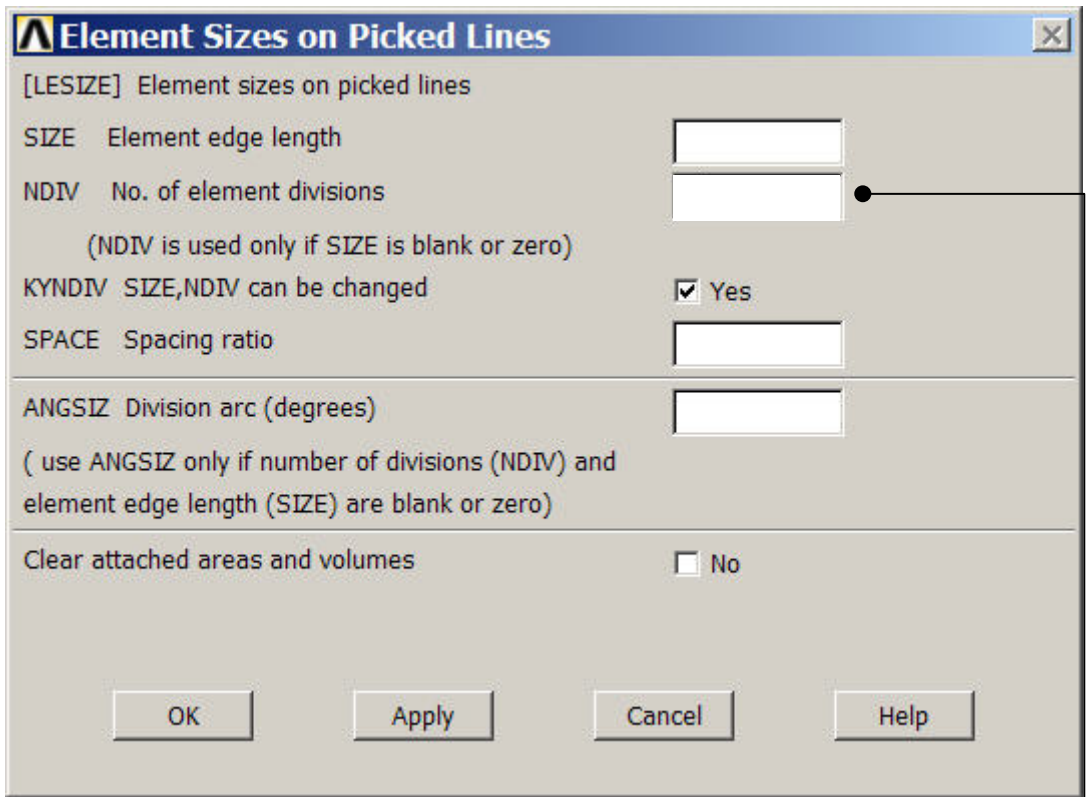
Preprocessor > Material Props > Material Models



Example - Meshing

Preprocessor > Meshing > Size Cntrls > ManualSize > Lines > Picked Lines





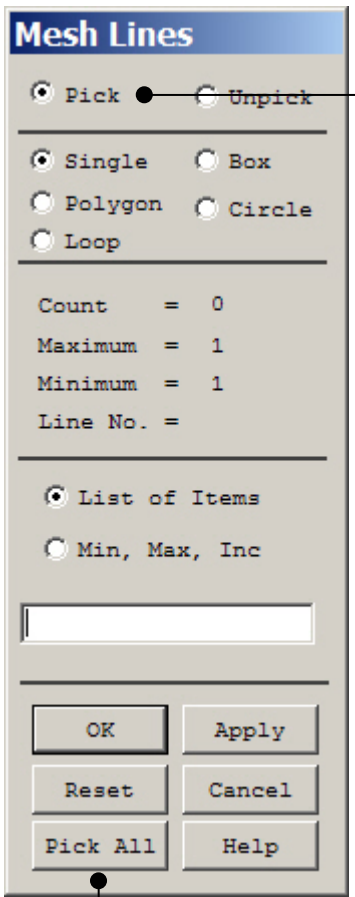
Select/Pick Lines to specify mesh size for

Press OK when finish with selection

Enter 1

Example - Meshing

Preprocessor > Meshing > Mesh > Lines



Select individual lines to be meshed by Picking

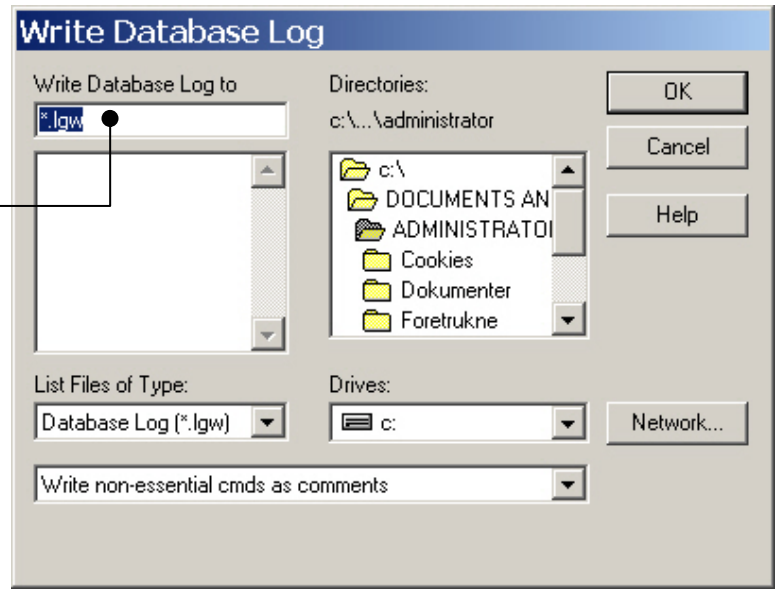
NB: It is often necessary to “Clear” the model for example if Element Type is to be changed

Select all lines defined to be meshed

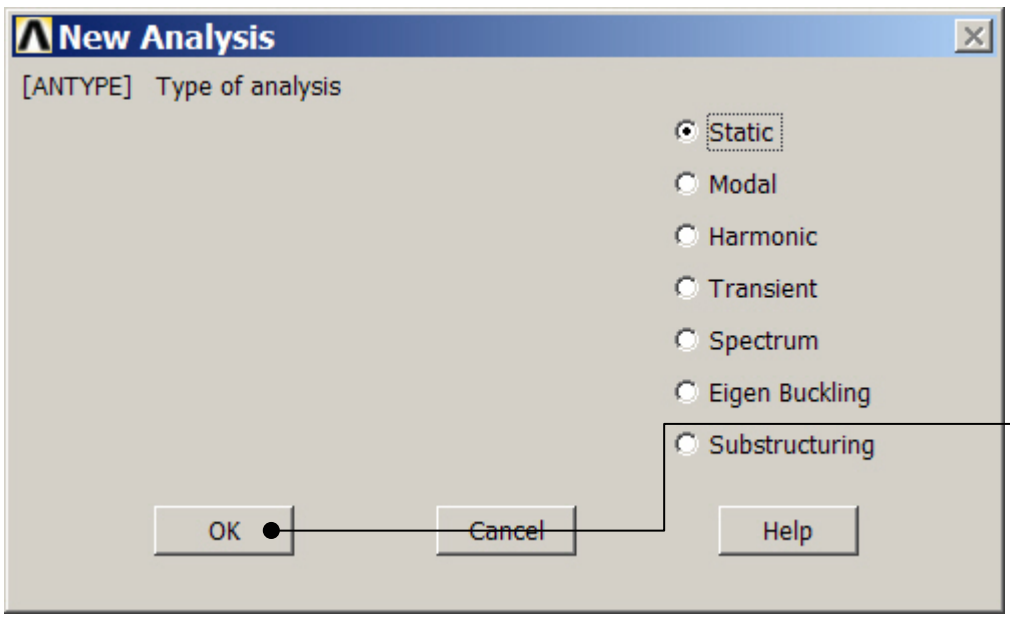
Example – Analysis Type

File > Write DB log file

Enter “example0110.lgw”



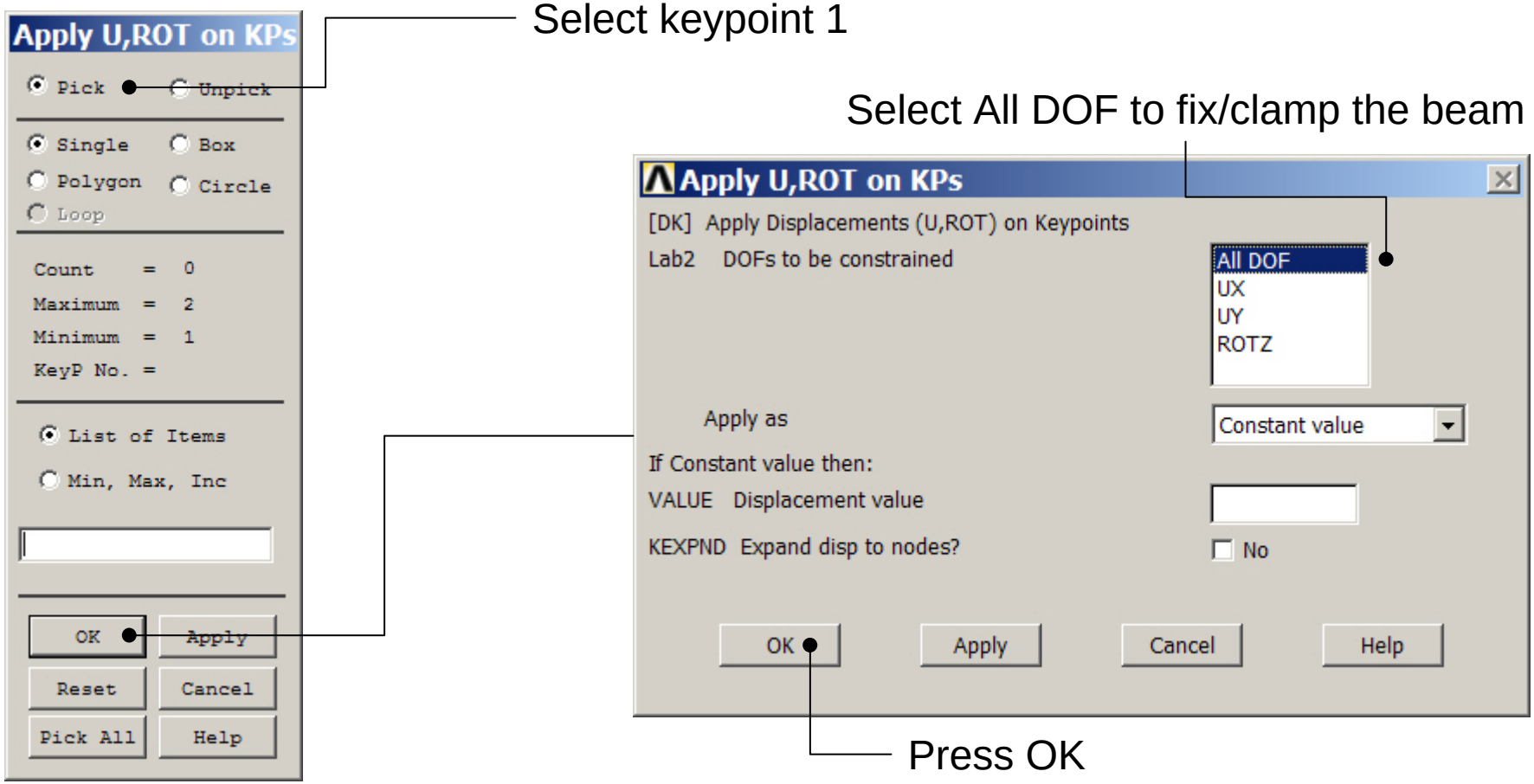
Solution > Analysis Type > New Analysis



Press OK

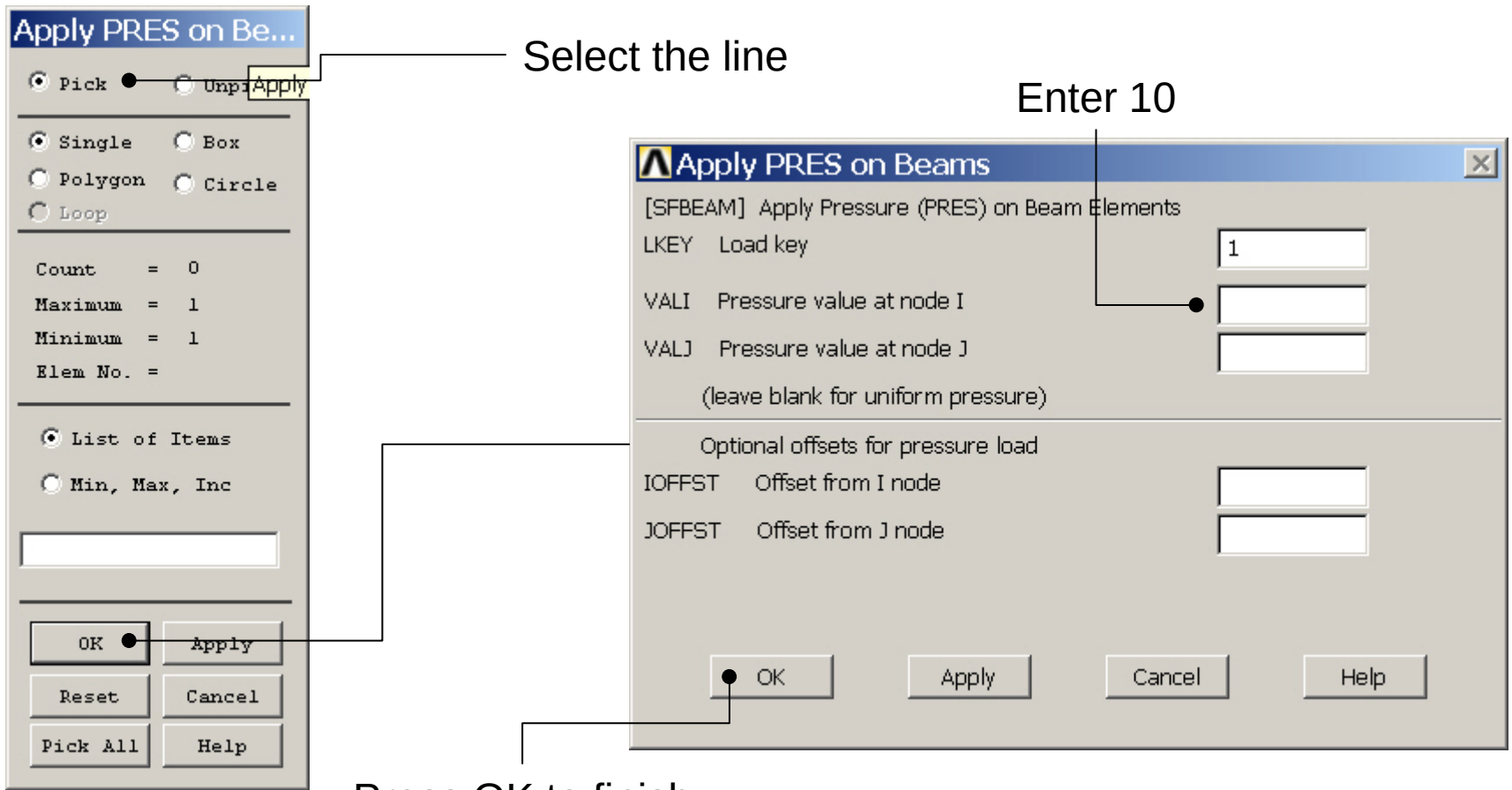
Example – Define Loads

Solution > Define Loads > Apply > Structural > Displacement > On Keypoints

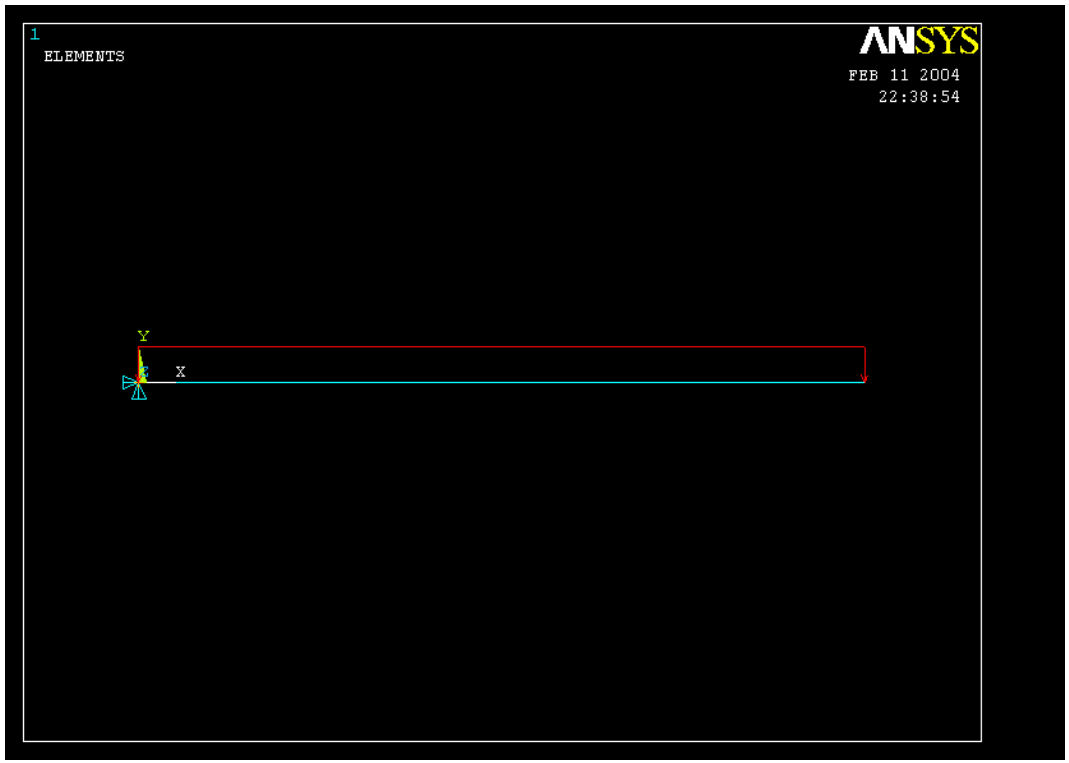


Example – Define Loads

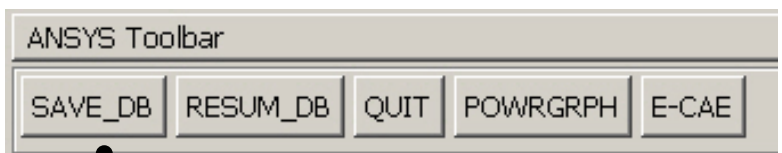
Solution > Define Loads > Apply > Structural > Pressure > On Beams



Example - Save



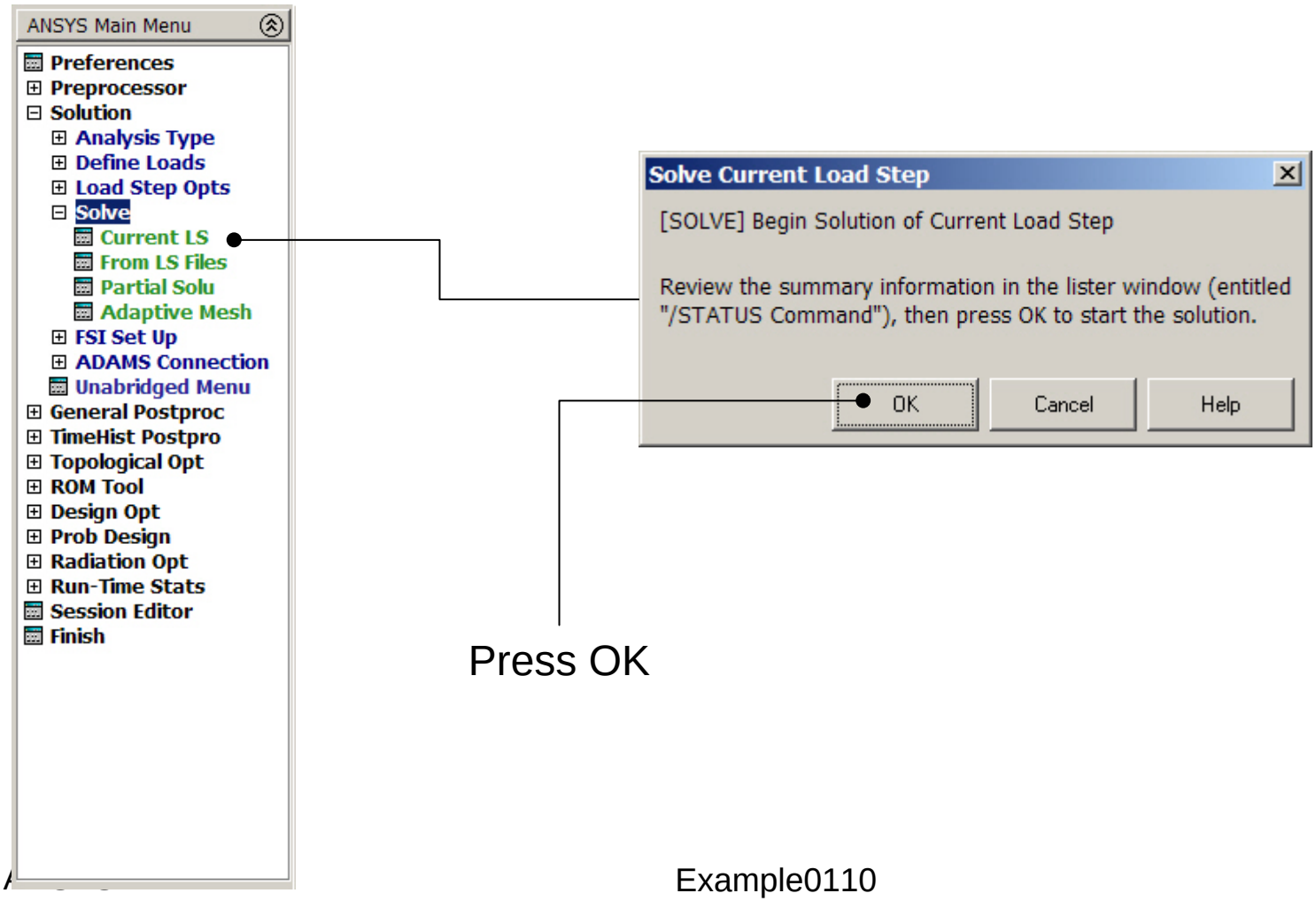
Display of Analysis model



Save the model

Example - Solve

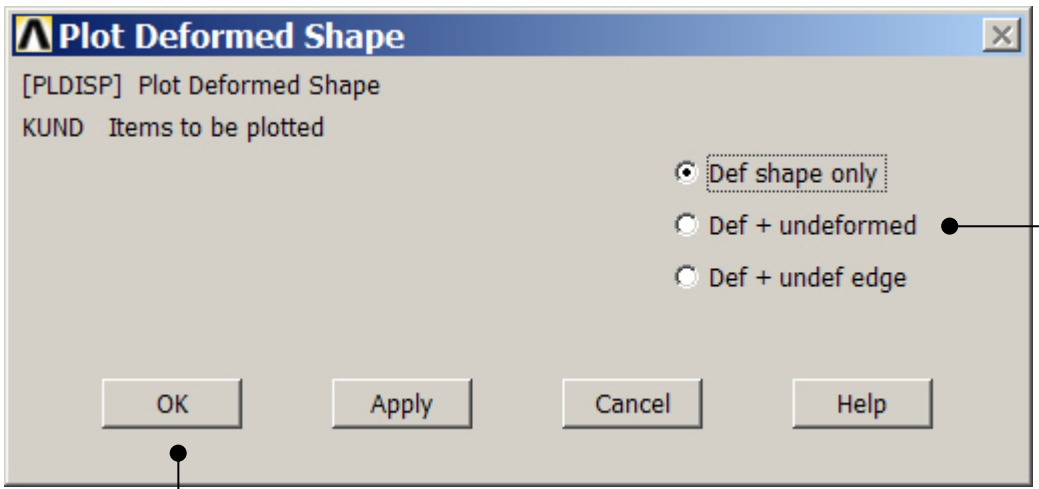
Solution > Solve > Current LS



Press OK

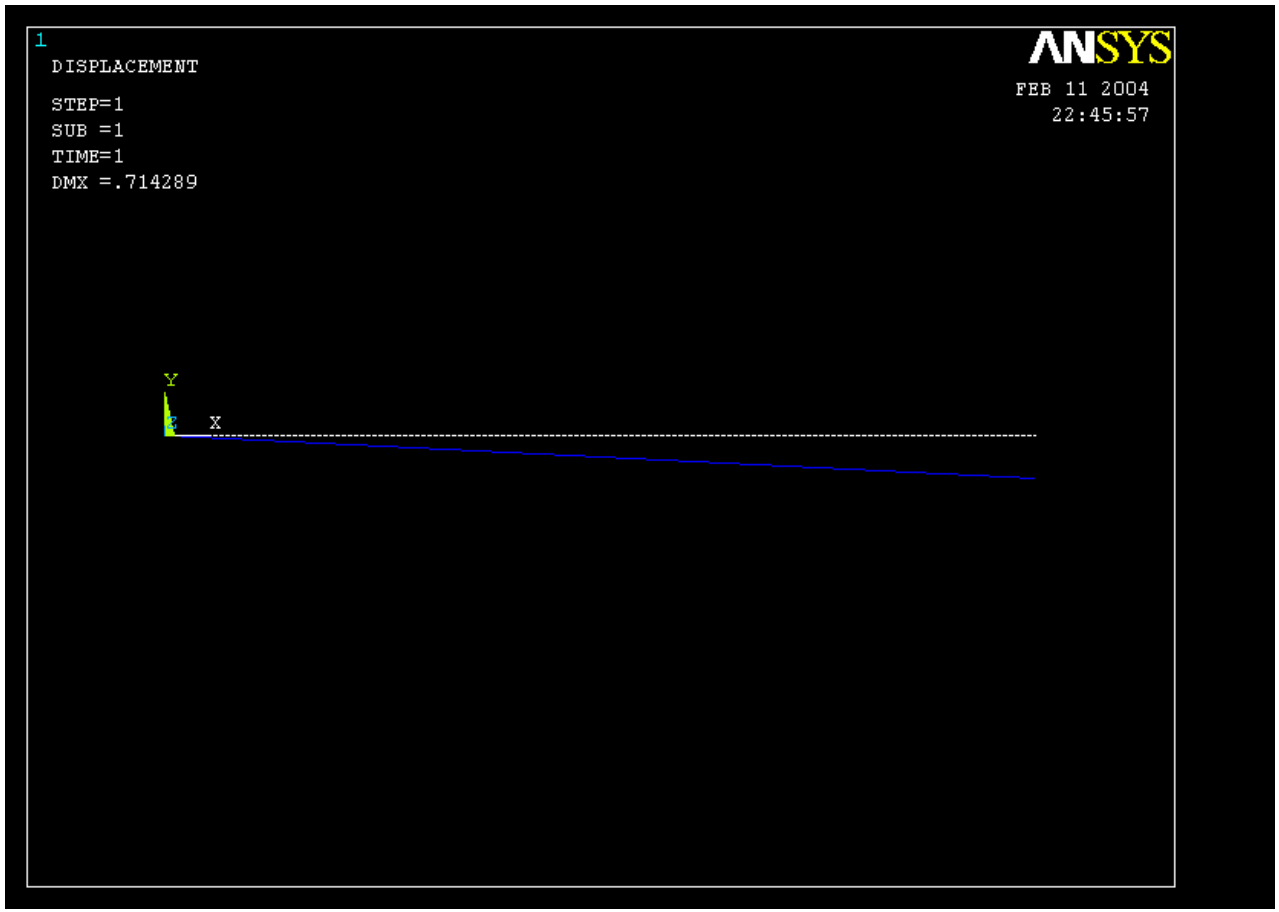
Example - PostProcessing

General Postproc > Plot Results > Deformed Shape



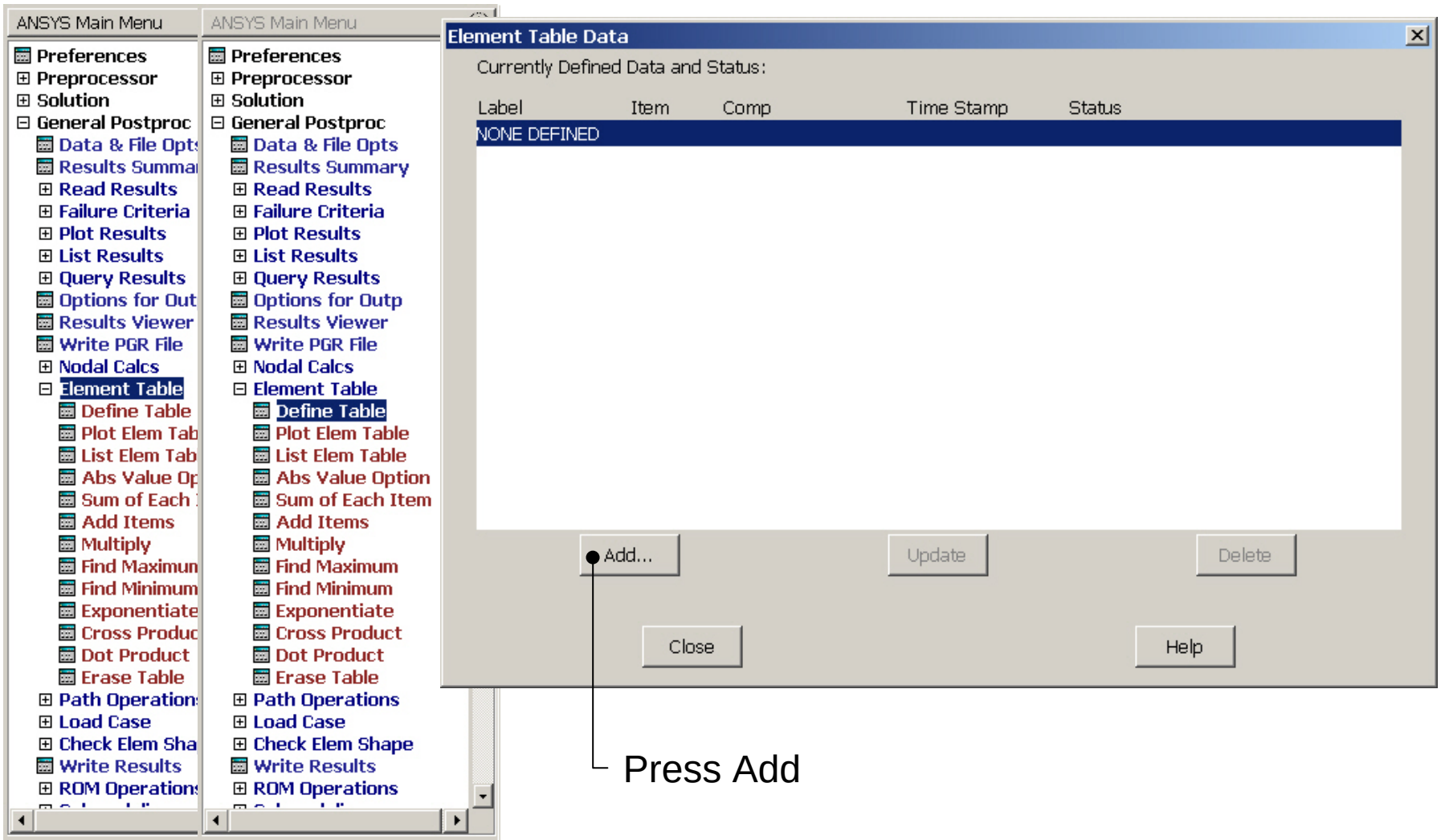
Select “Def+undeformed” and Press OK

Example - PostProcessing



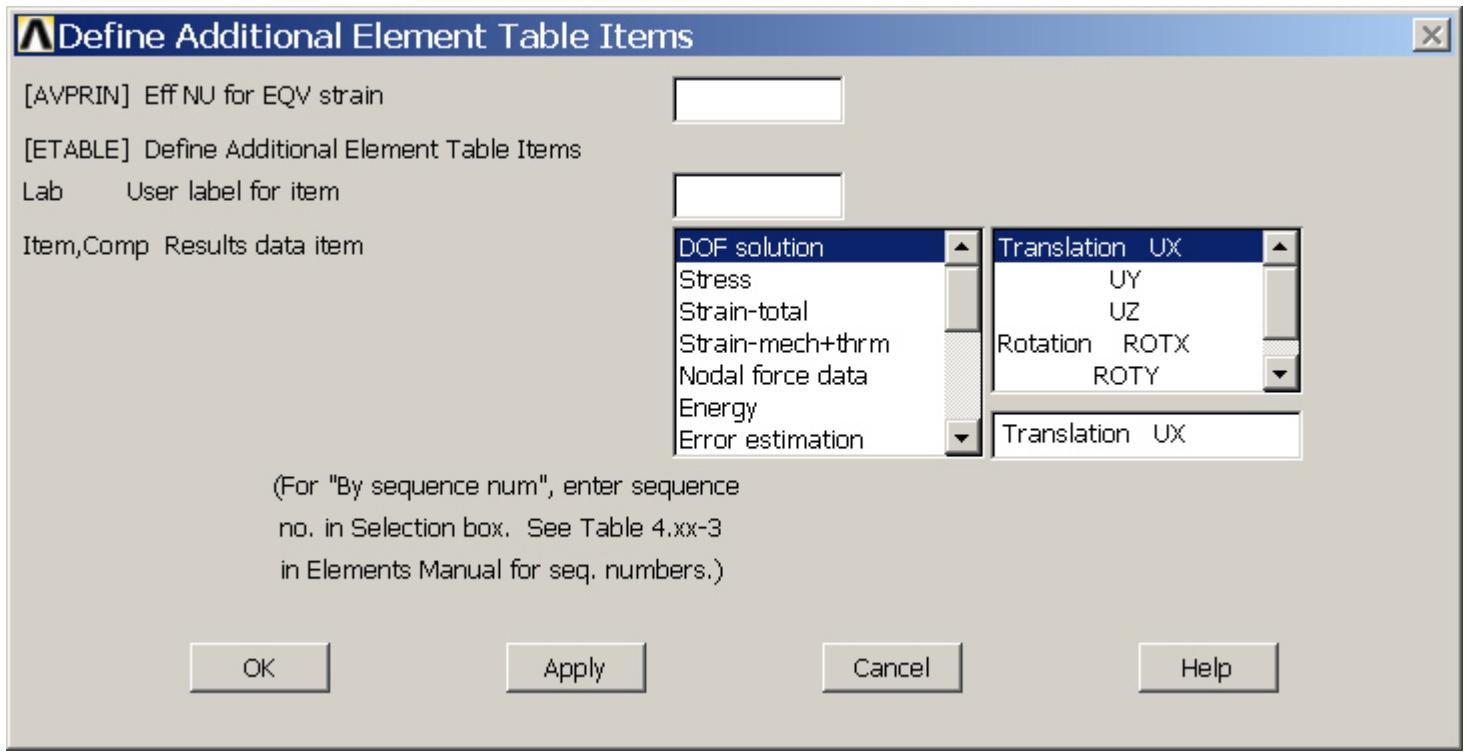
Read Maximum displacement: DMX

Example – Element Table



Press Add

Example – Element Table



Example – Element Table

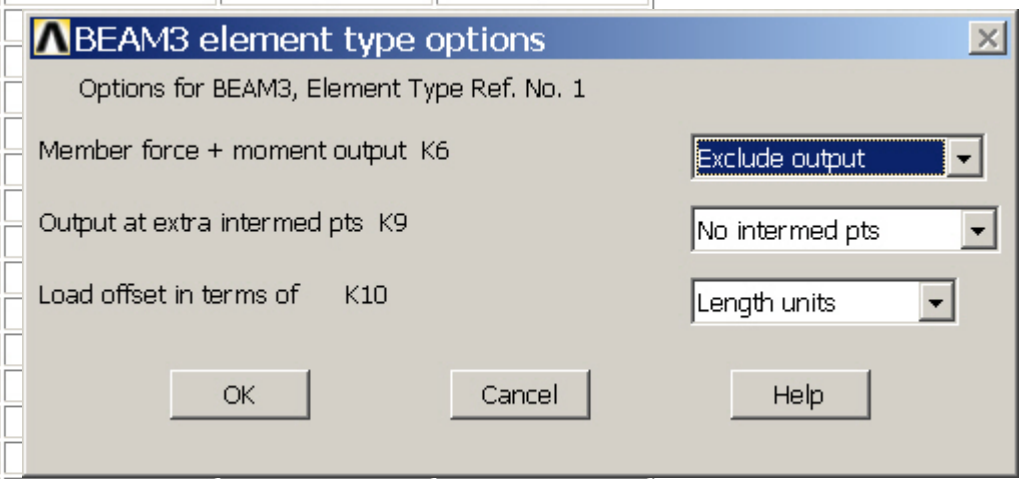
Name	Definition	O	R
EL	Element Number	Y	Y
NODES	Element nodes - I, J	Y	Y
MAT	Element material number	Y	Y
VOLU:	Element volume	N	Y
XC, YC	Location where results are reported	Y	3
TEMP	Temperatures T1, T2, T3, T4	Y	Y
PRES	Pressure P1 at nodes I,J; OFFST1 at I,J; P2 at I,J; OFFST2 at I, J; P3 at I; P4 at J	Y	Y
SDIR	Axial direct stress	1	1
SBYT	Bending stress on the element +Y side of the beam	1	1
SBYB	Bending stress on the element -Y side of the beam	1	1
SMAX	Maximum stress (direct stress + bending stress)	1	1
SMIN	Minimum stress (direct stress - bending stress)	1	1
EPELDIR	Axial elastic strain at the end	1	1
EPELBYT	Bending elastic strain on the element +Y side of the beam	1	1
EPELBYB	Bending elastic strain on the element -Y side of the beam	1	1
EPTHDIR	Axial thermal strain at the end	1	1
EPTHBYT	Bending thermal strain on the element +Y side of the beam	1	1
EPTHBYB	Bending thermal strain on the element -Y side of the beam	1	1
EPINAXL	Initial axial strain in the element	1	1
MFOR(X, Y)	Member forces in the element coordinate system X and Y direction	2	Y
MMOMZ	Member moment in the element coordinate system Z direction	2	Y

Example – Element Table

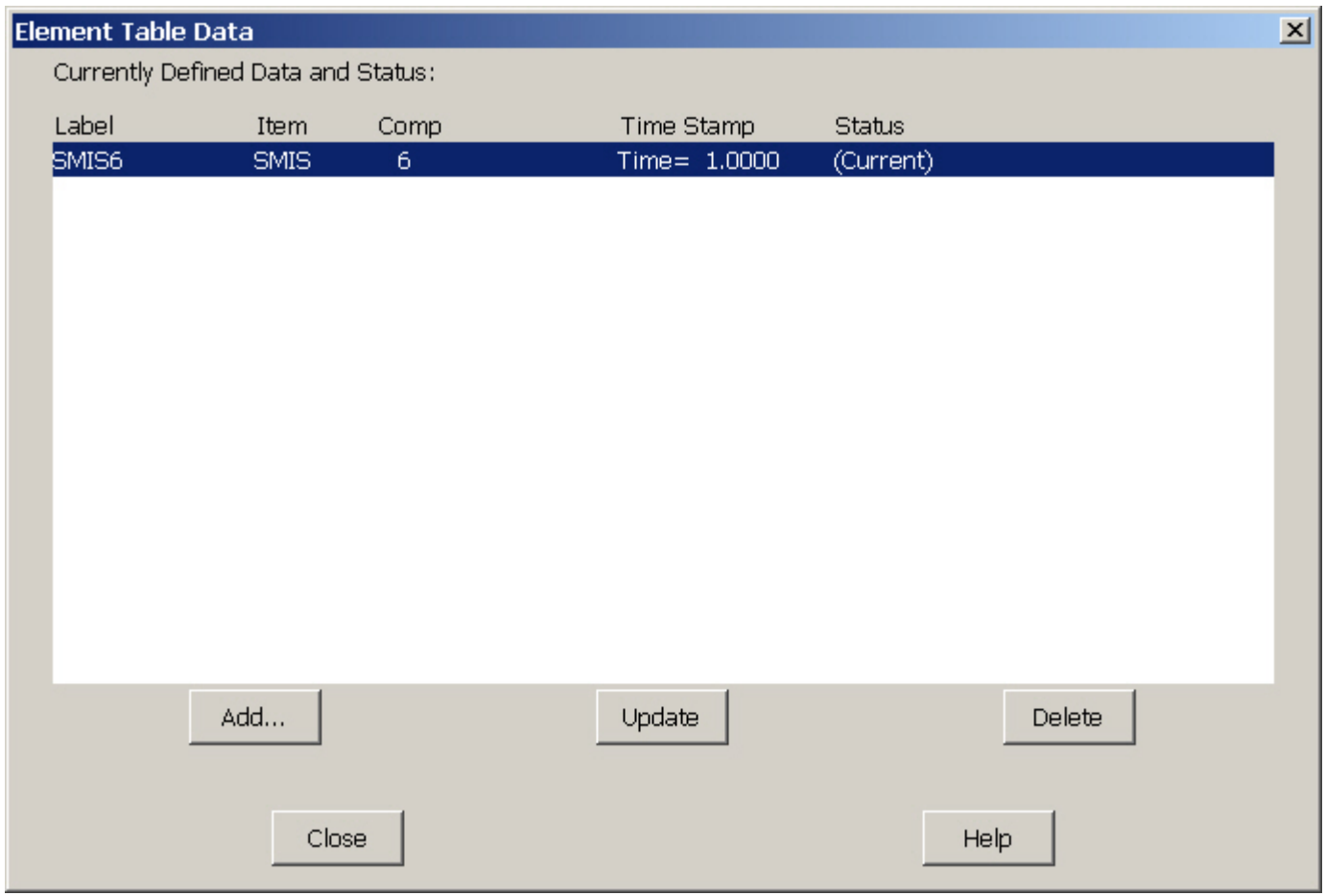
Table 3.2. BEAM3 Item and Sequence Numbers (KEYOPT(9) = 0)

Output Quantity Name	ETABLE and ESOL Command Input			
	Item	E	I	J
SDIR	LS	-	1	4
SBYT	LS	-	2	5
SBYB	LS	-	3	6
EPELDIR	LEPEL			
EPELBYT	LEPEL			
EPELBYB	LEPEL			
EPTHDIR	LEPTH			
EPTHBYT	LEPTH			
EPTHBYB	LEPTH			
EPINAXL	LEPTH			
SMAX	NMISC			
SMIN	NMISC			
MFORX	SMISC			
MFORY	SMISC			
MMOMZ	SMISC			
P1	SMISC			
OFFST1	SMISC	-	15	16
P2	SMISC	-	17	18
OFFST2	SMISC	-	19	20
P3	SMISC	-	21	-
P4	SMISC	-	-	22

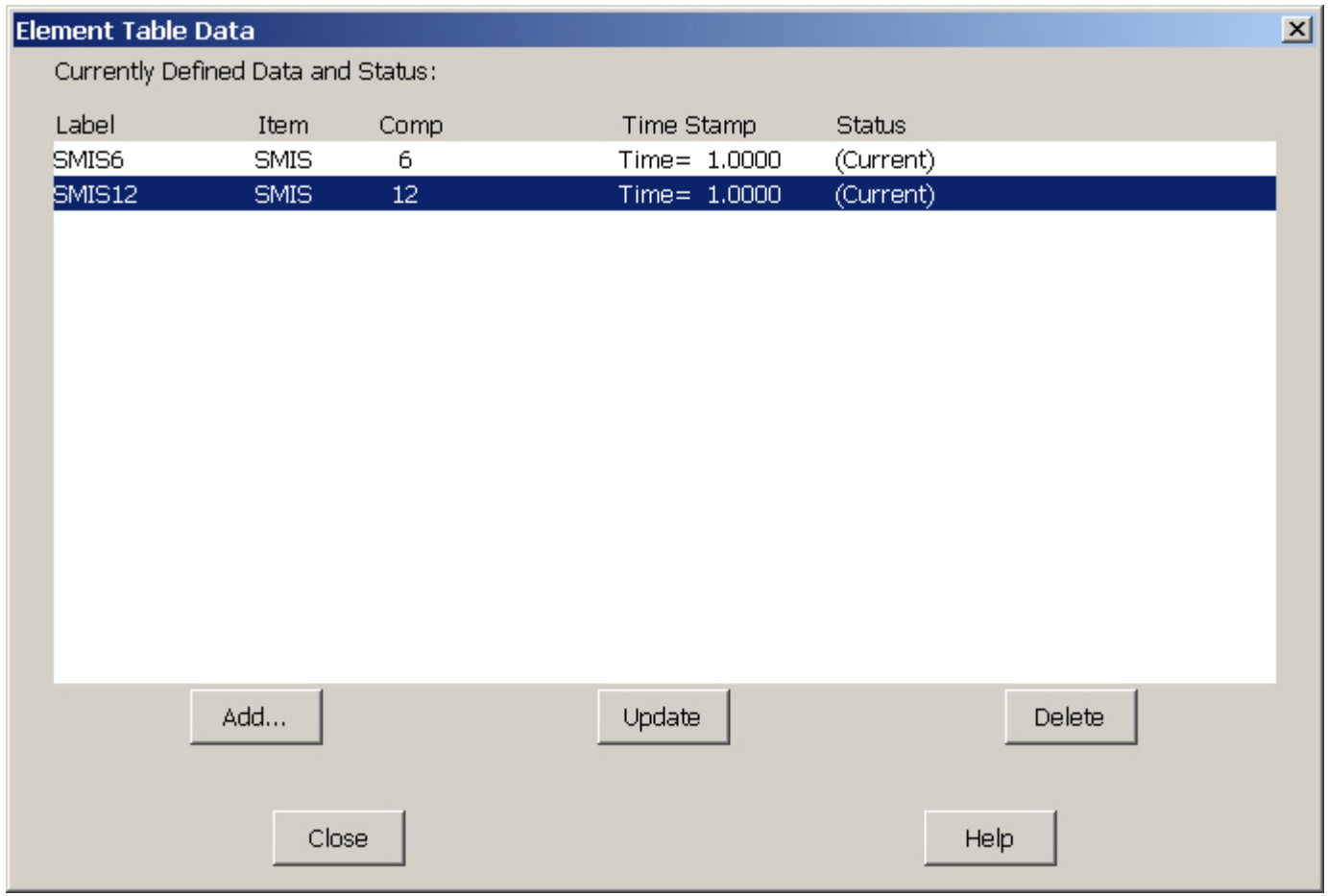
		Pseudo Node			
		1	2	3	4
TEMP	LBFE	1	2	3	4



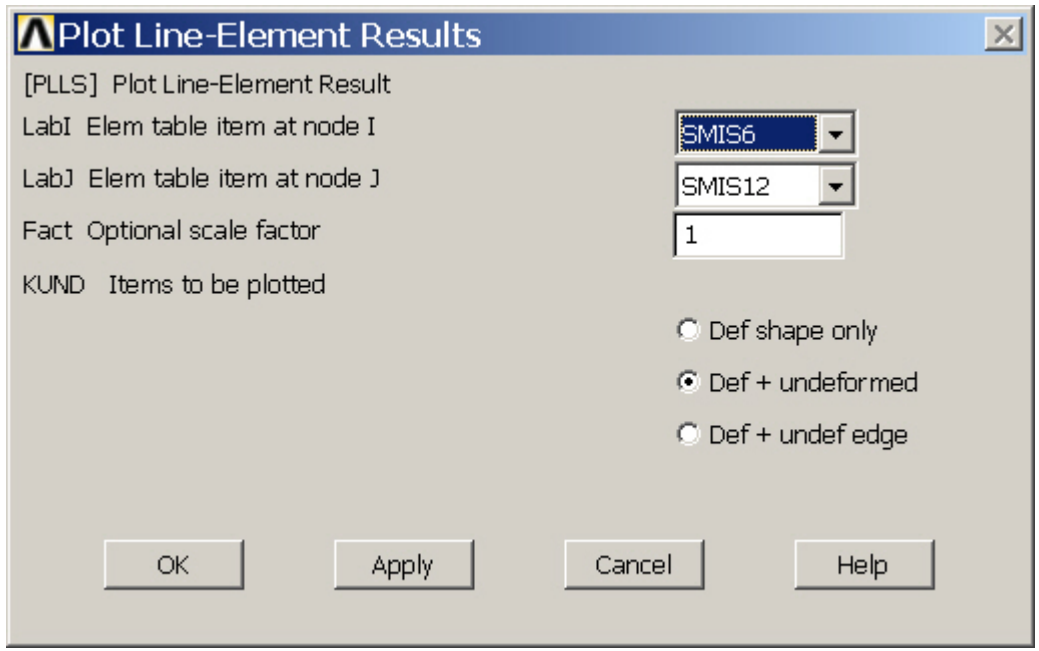
Example – Element Table



Example – Element Table



Example – Plot Line-Element



Example – Plot Line-Element