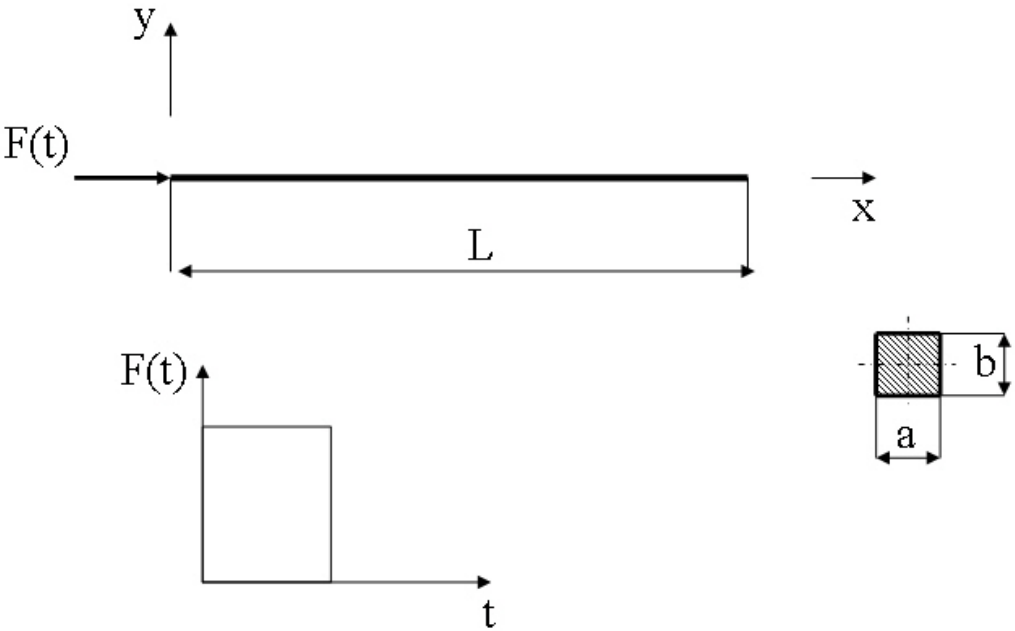
Course in ANSYS

Example0420

Example – Rod



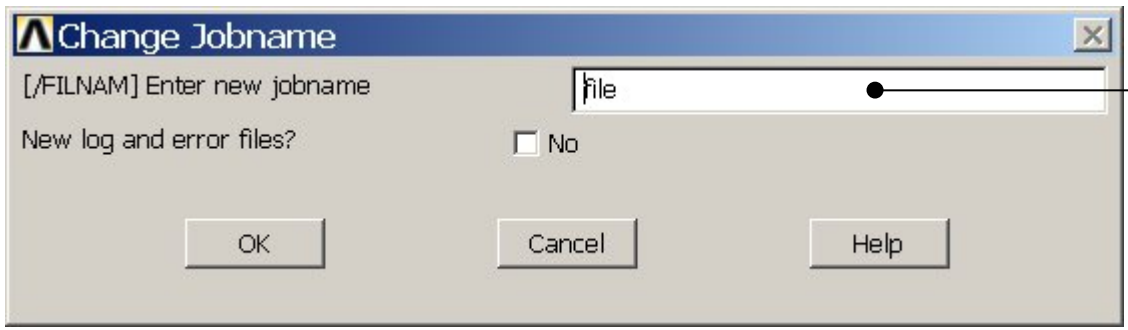
Objective:
Compute the transient response
Tasks:
Perform a transient analysis
Topics:
Topics: Start of analysis, Element type,
Real constants, Material, modeling, transient analysis

$E = 200E9 N/m^2$
$\nu = 0.3$
$L = 1m$
$I = 0.1^4/12 m^4$
$\rho = 7860 kg/m^3$

Example - title

Utility Menu > File > Change Jobname — GUI

/jobname, Example0420 — Command line entry

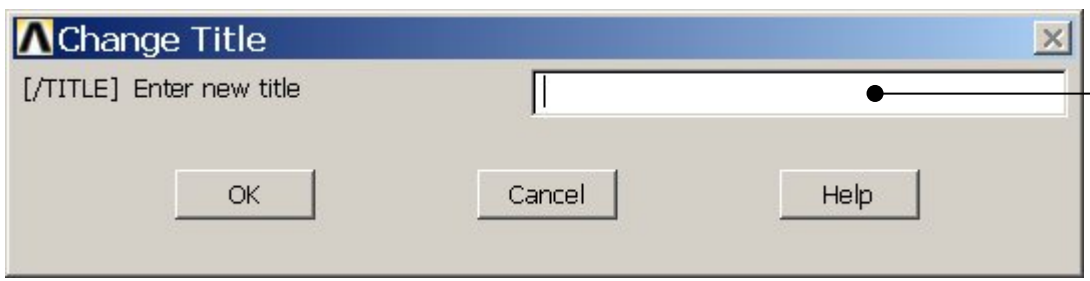


Enter: Example0420

Utility Menu > File > Change Title

/title, Rod

Enter: Rod



Example - Keypoints

Note: An empty # result in automatic numbering.

Preprocessor > Modeling > Create > Keypoints > In Active CS

/PREP7

K,,,,

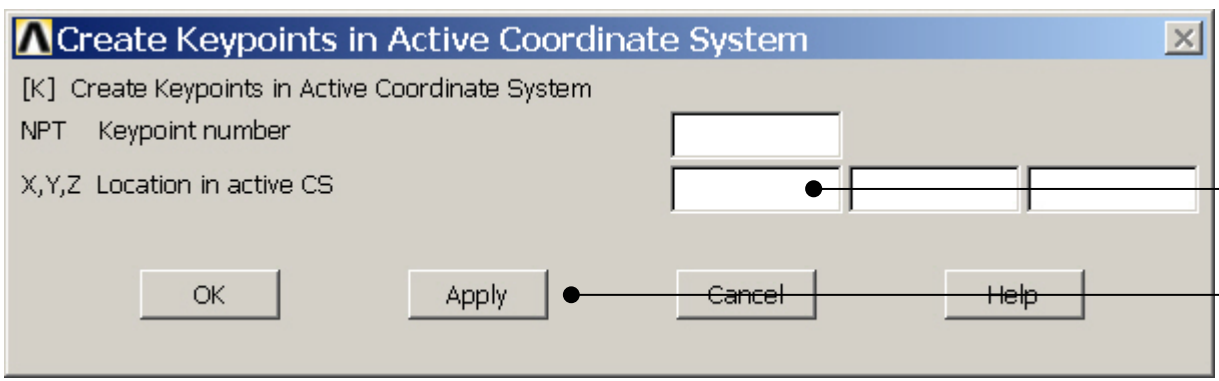
K,,100,,

General format:

K,#,X,Y,Z

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

Enter 0,0,0 and
Press **Apply**
Enter 100,0,0 and
Press **Apply**

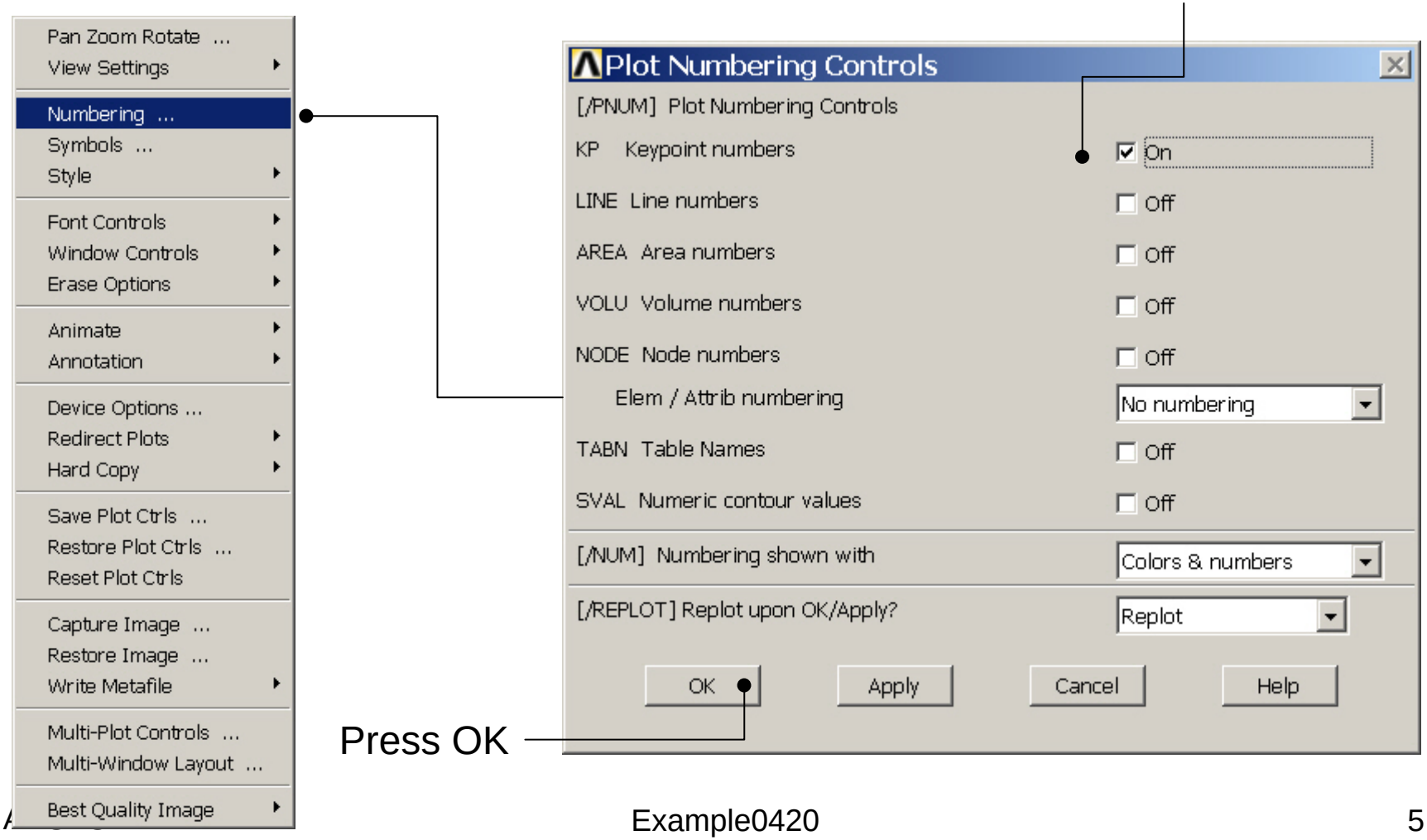


Note: An empty box result in a zero. It is allowed to enter 0.0 in each box.

Example - Numbering

Utility Menu > PlotCtrls > Numbering

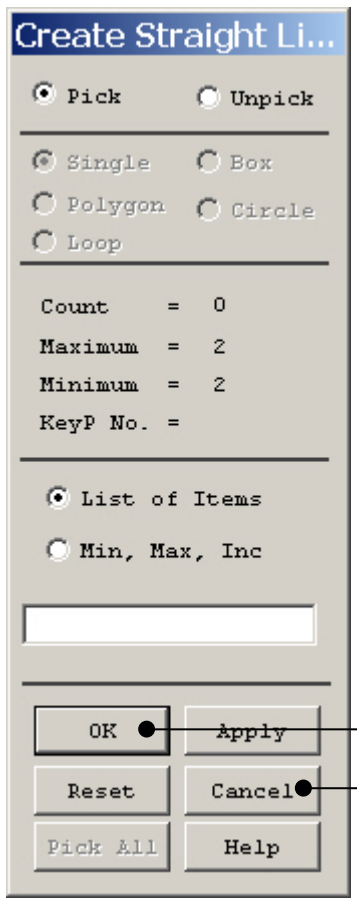
Switch on Keypoint numbers



Press OK

Example - Lines

Preprocessor > Modeling > Create > Lines > Lines > Straight Line
Create a line between KP1 and KP2.
L,1,2



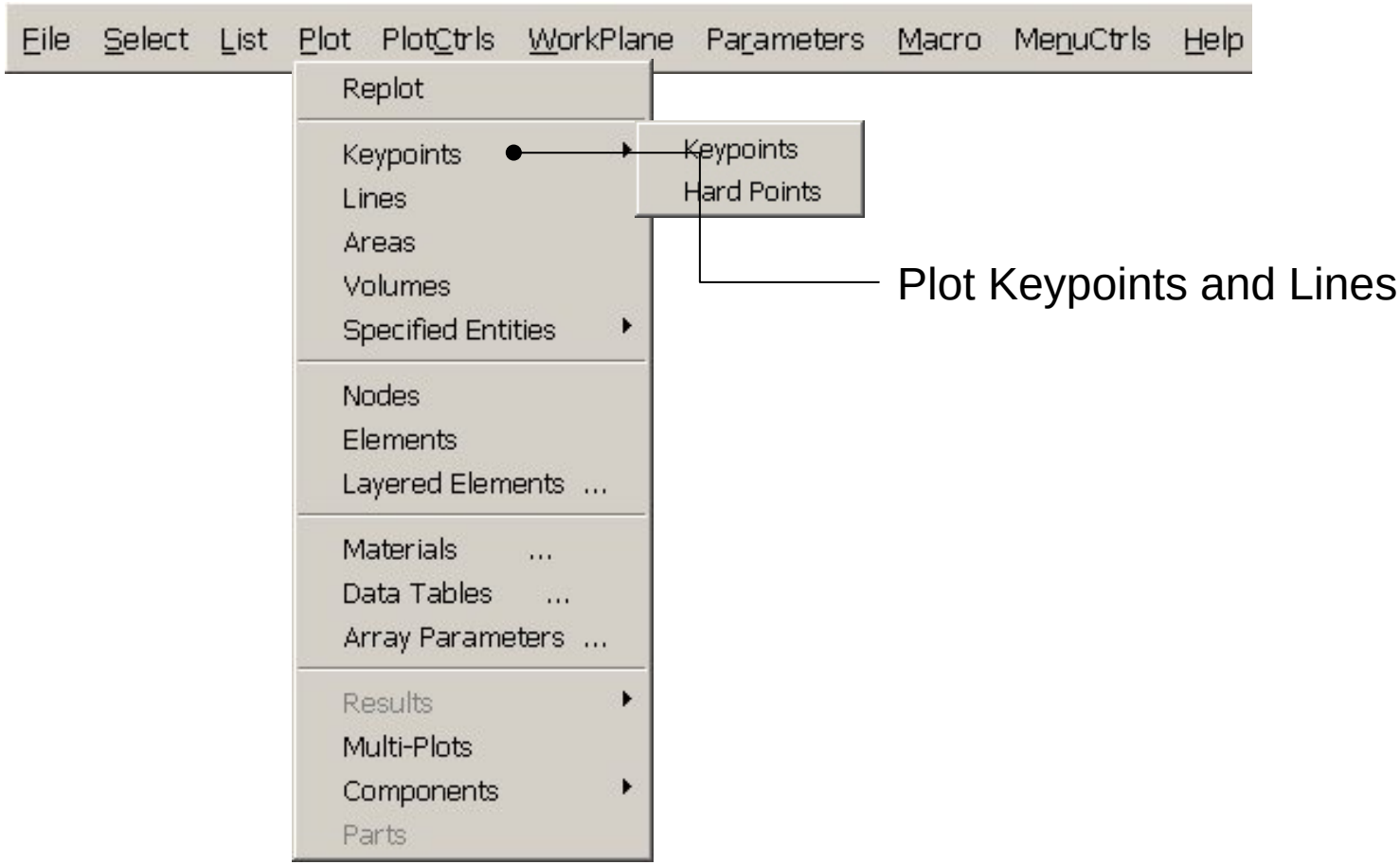
HINT: By clicking with the right-hand mouse button you shift between the Pick/Unpick function. This is indicated by the direction of the cursor arrow:

Pick: upward arrow

Unpick: downward arrow

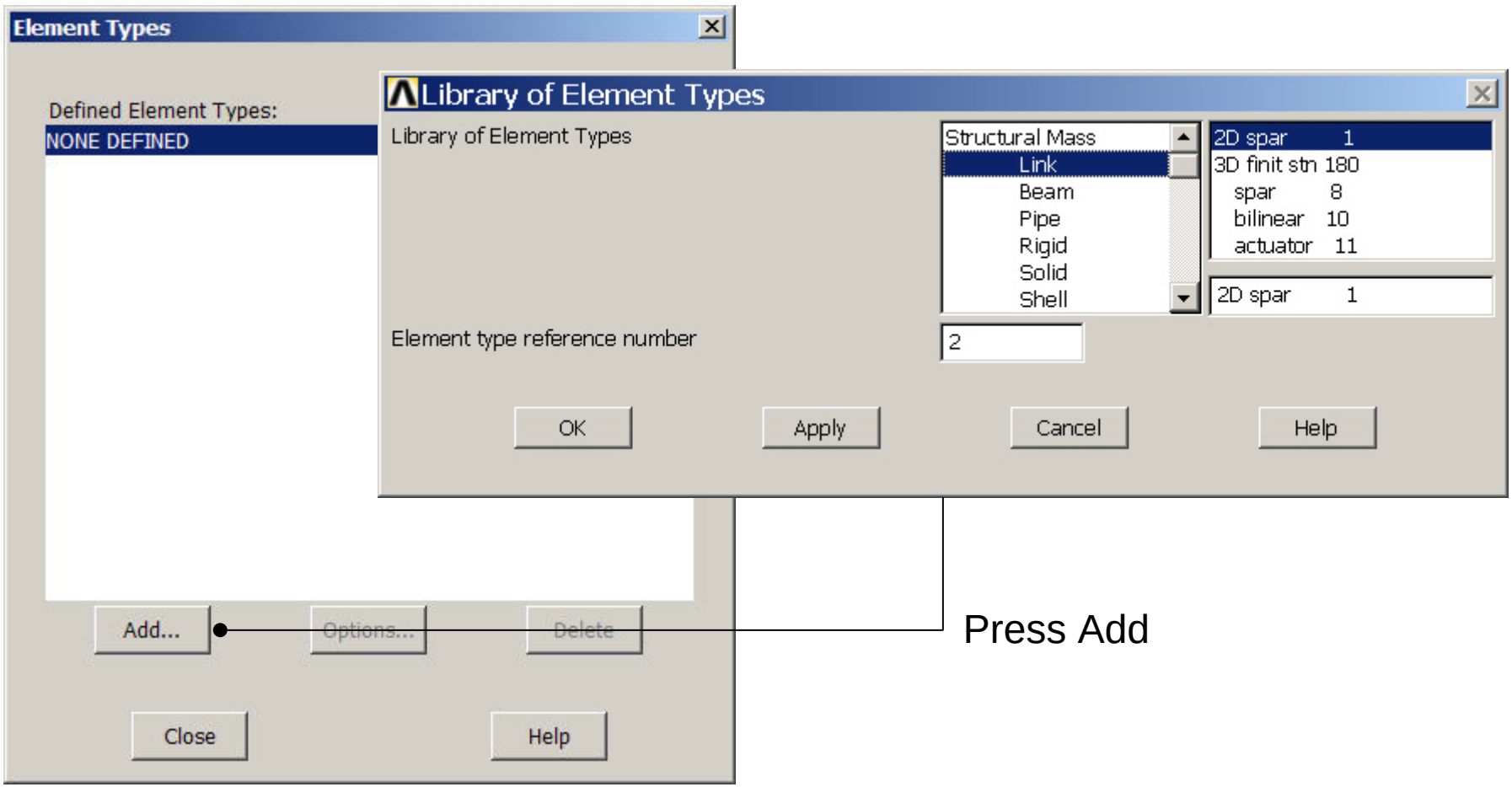
Press OK or Cancel to finish selection

Example - Plot - Nodes



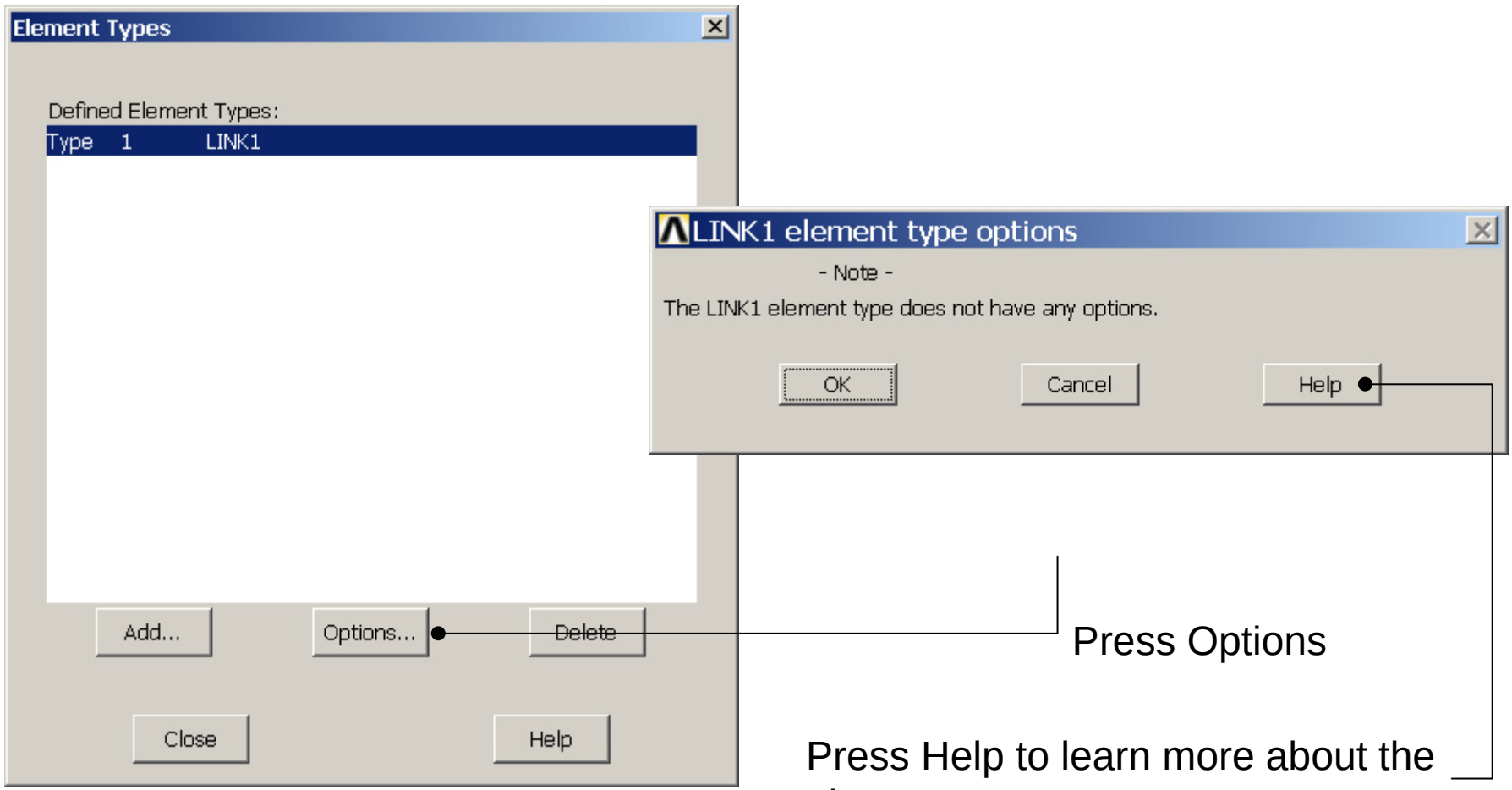
Example – Element Type

Preprocessor > Element Type > Add/Edit/Delete



Example - Element Type

Preprocessor > Element Type > Add/Edit/Delete

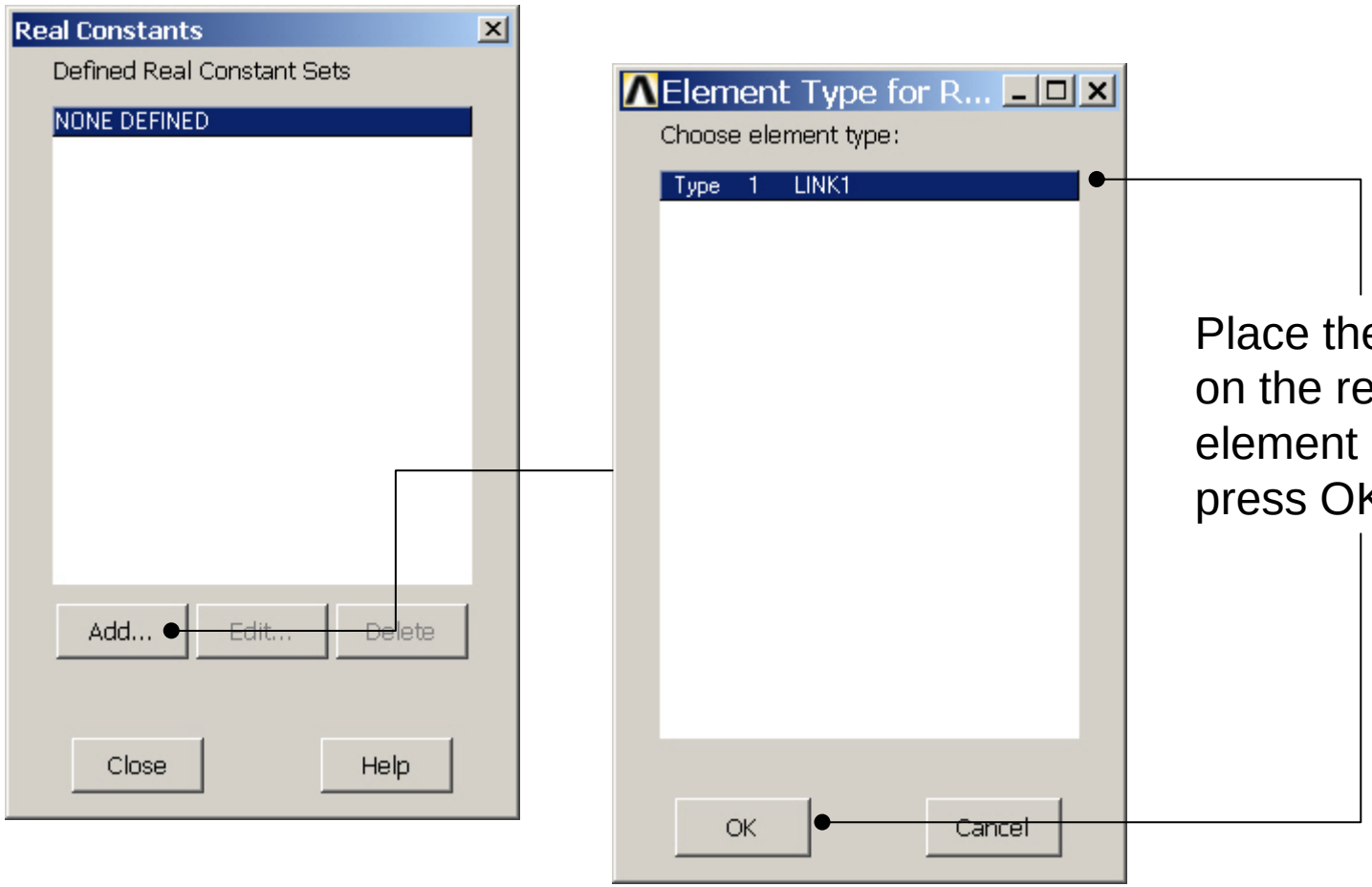


Press Options

Press Help to learn more about the element.

Example – Real Constants

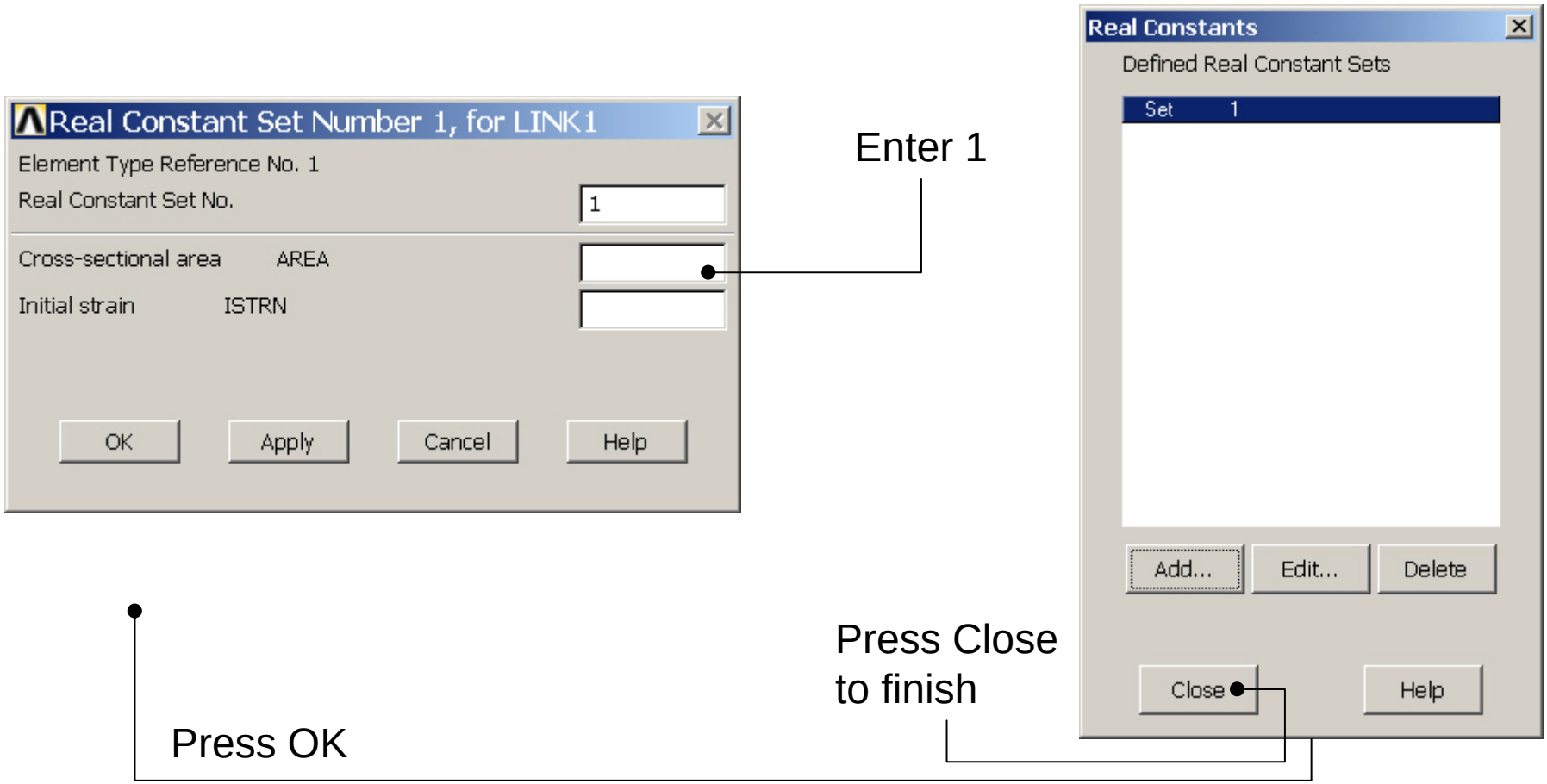
Preprocessor > Real Constants > Add



Place the cursor on the relevant element and press OK

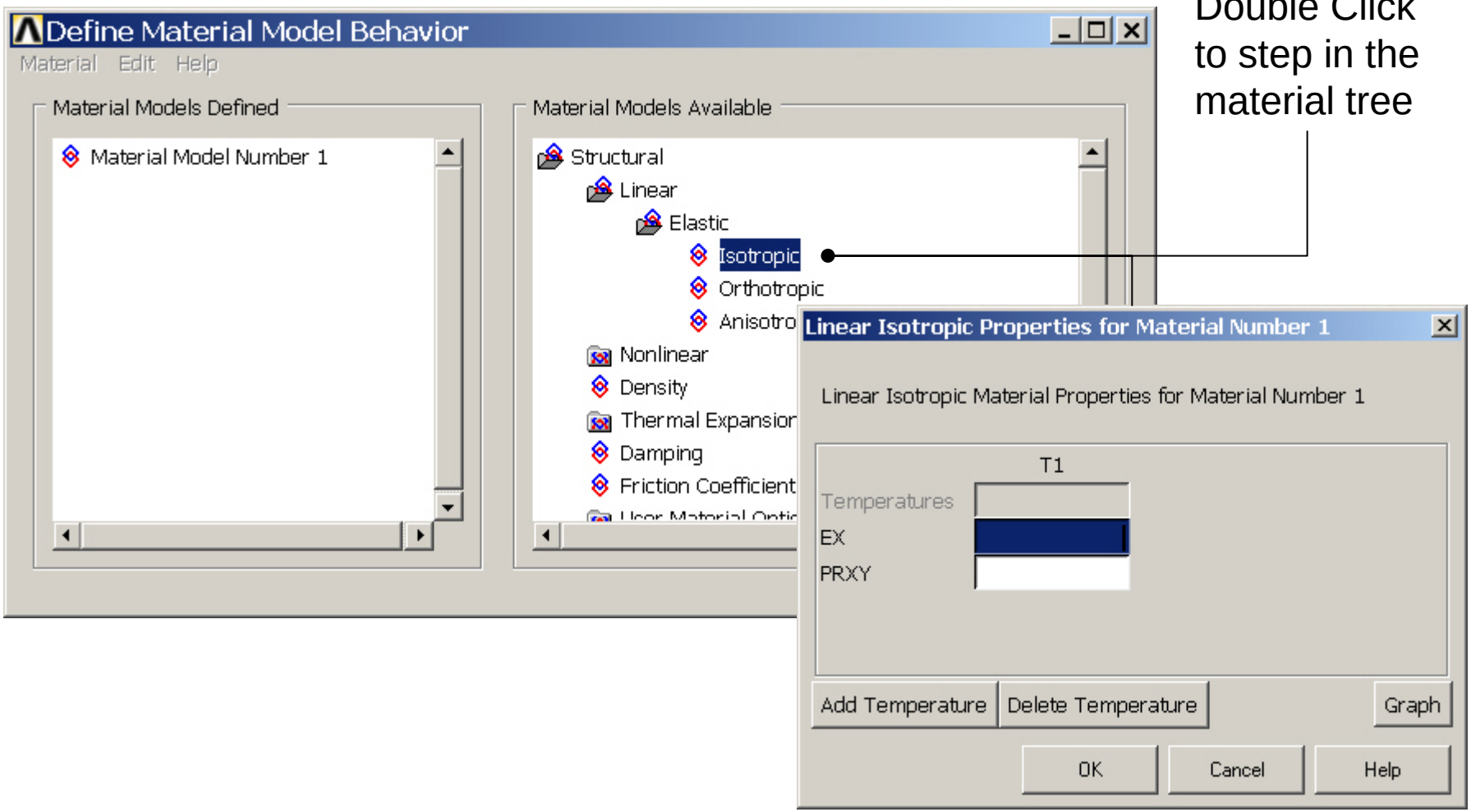
Example - Real Constants

Preprocessor > Real Constants > Add



Example - Material Properties

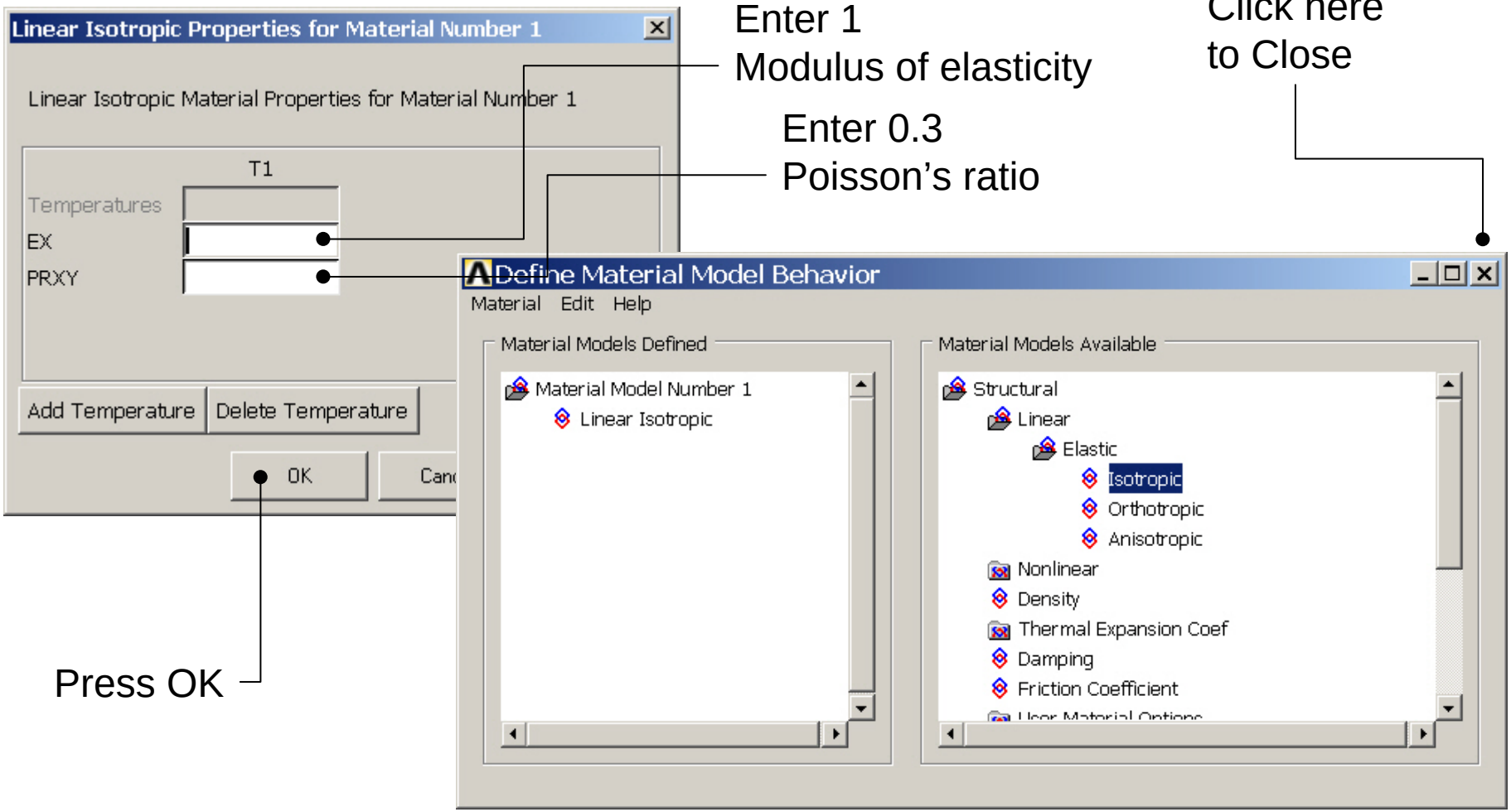
Preprocessor > Material Props > Material Models



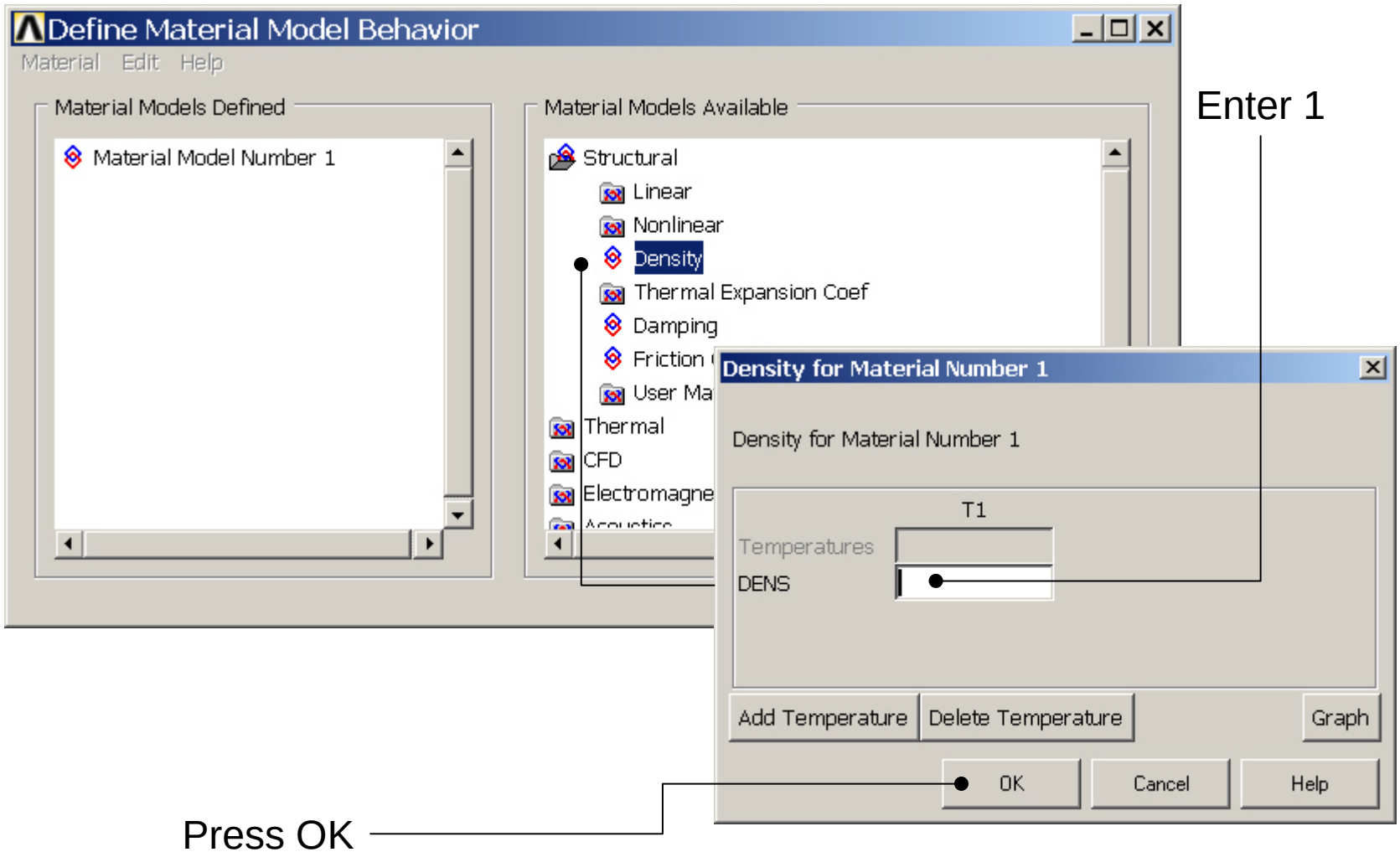
Double Click to step in the material tree

Example - Material Properties

Preprocessor > Material Props > Material Models

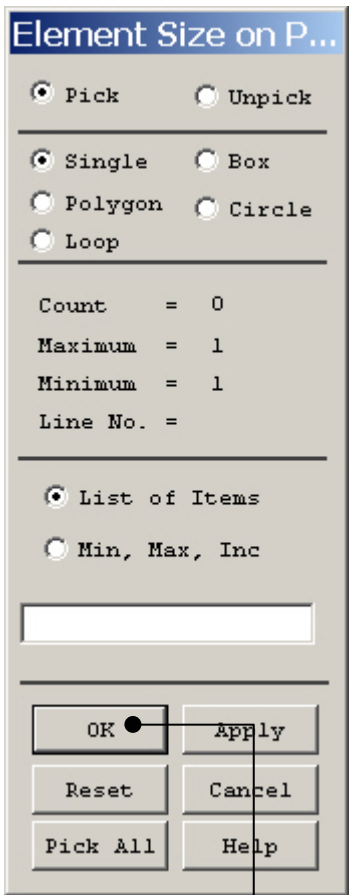


Example - Density

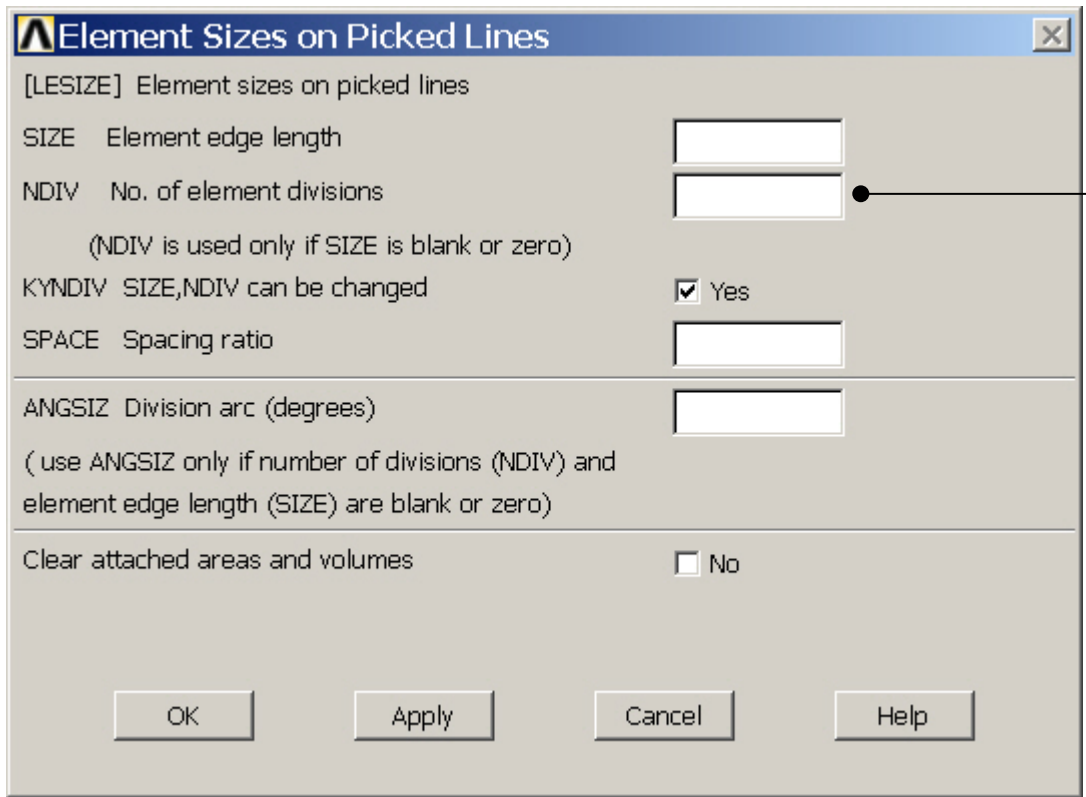


Example - Meshing

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



Select/Pick L1

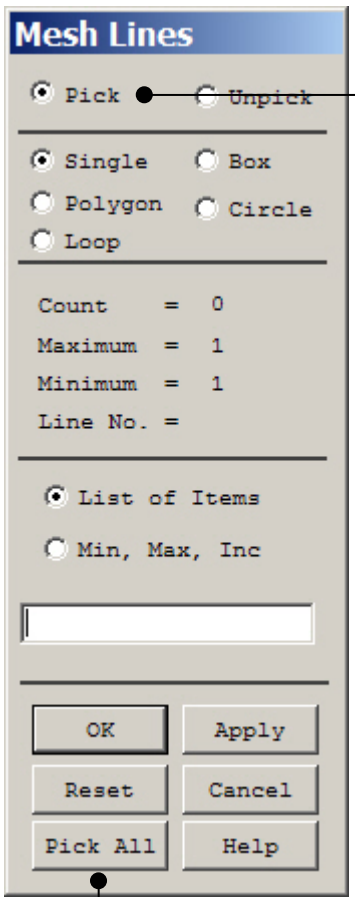


Press OK when finish with selection

Enter 10

Example - Meshing

Preprocessor > Meshing > Mesh > Lines



Select individual lines to be meshed by Picking

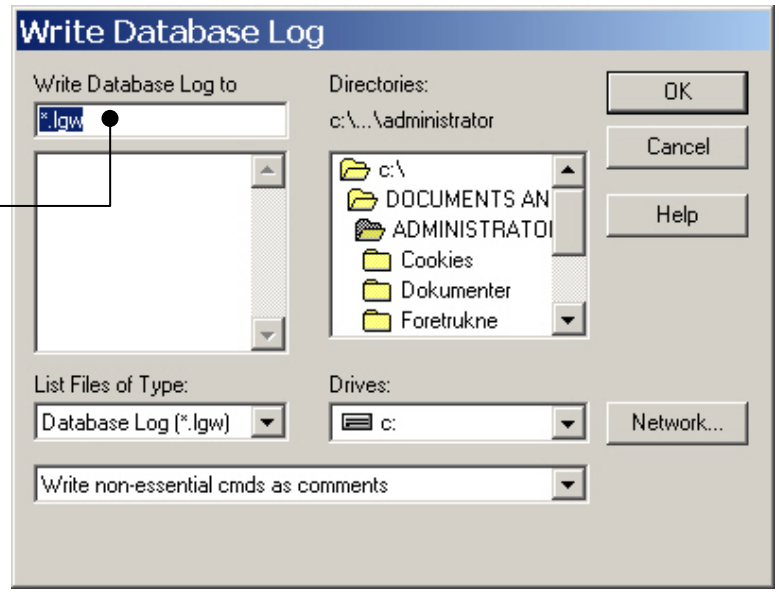
NB: It is often necessary to “Clear” the model for example if Element Type is to be changed

Select all lines defined to be meshed

Example – Analysis Type

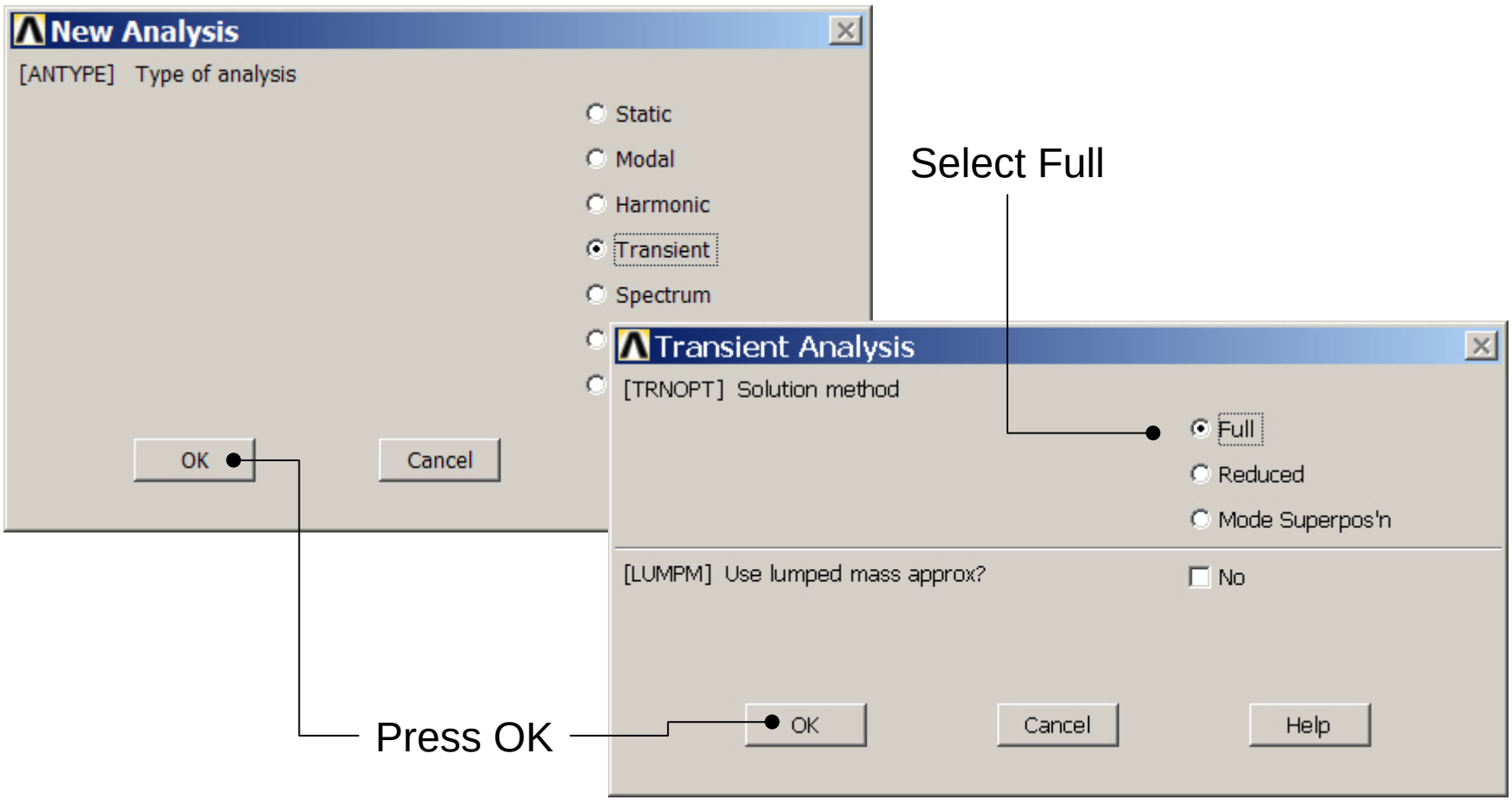
File > Write DB log file

Enter “example0420.lgw”

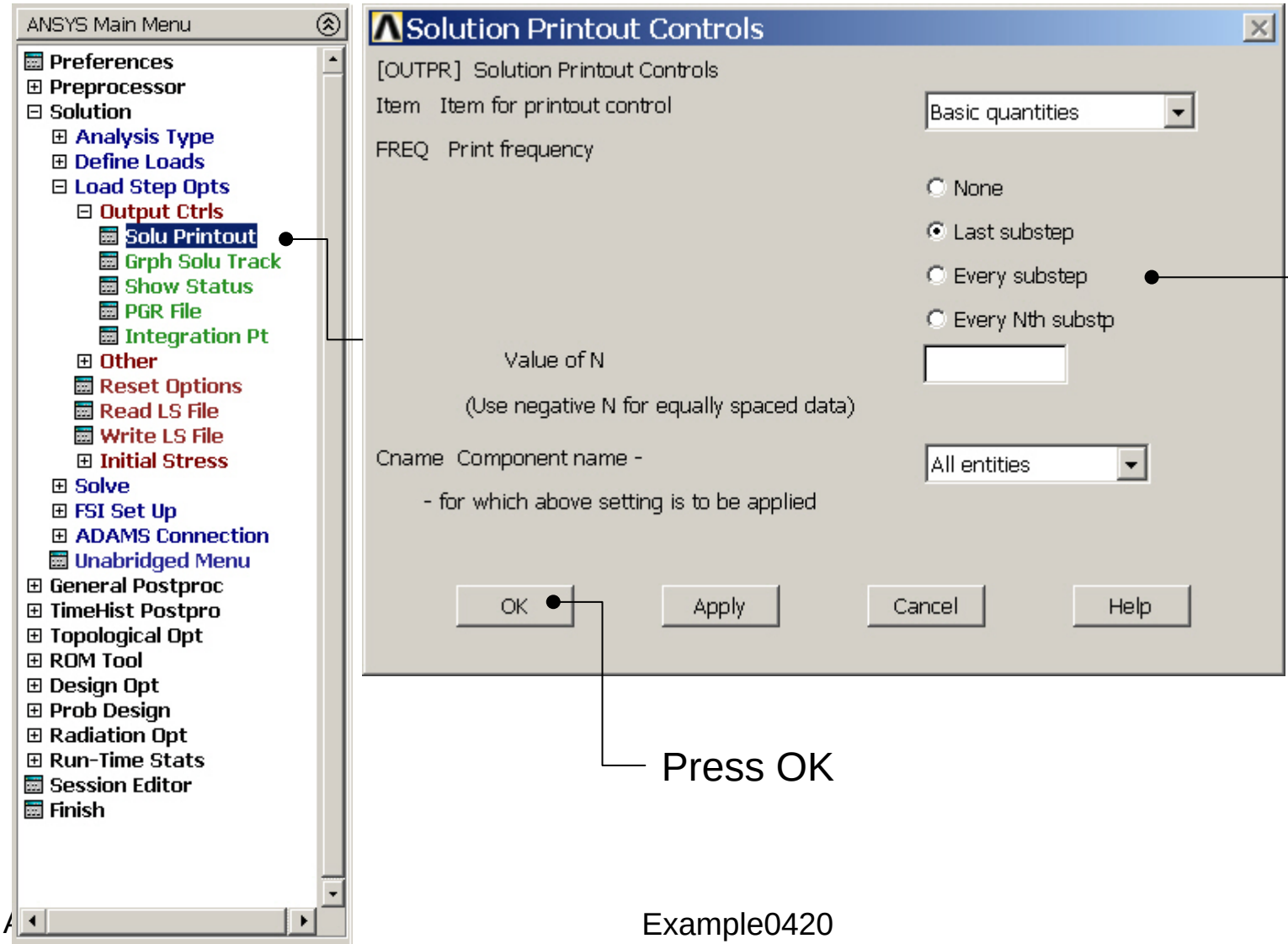


Example – Analysis Type

Solution > Analysis Type > New Analysis

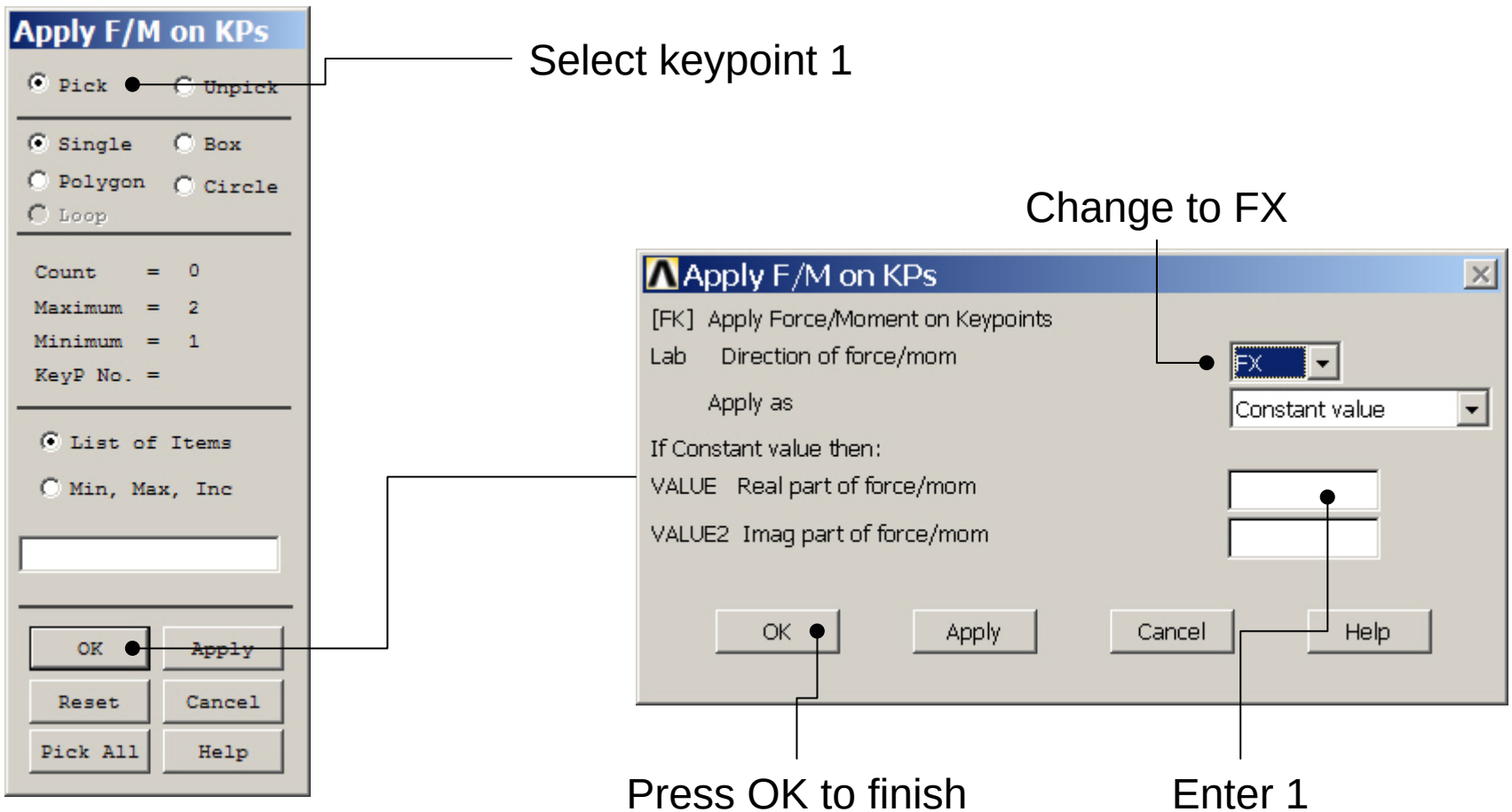


Example – Printout Controls

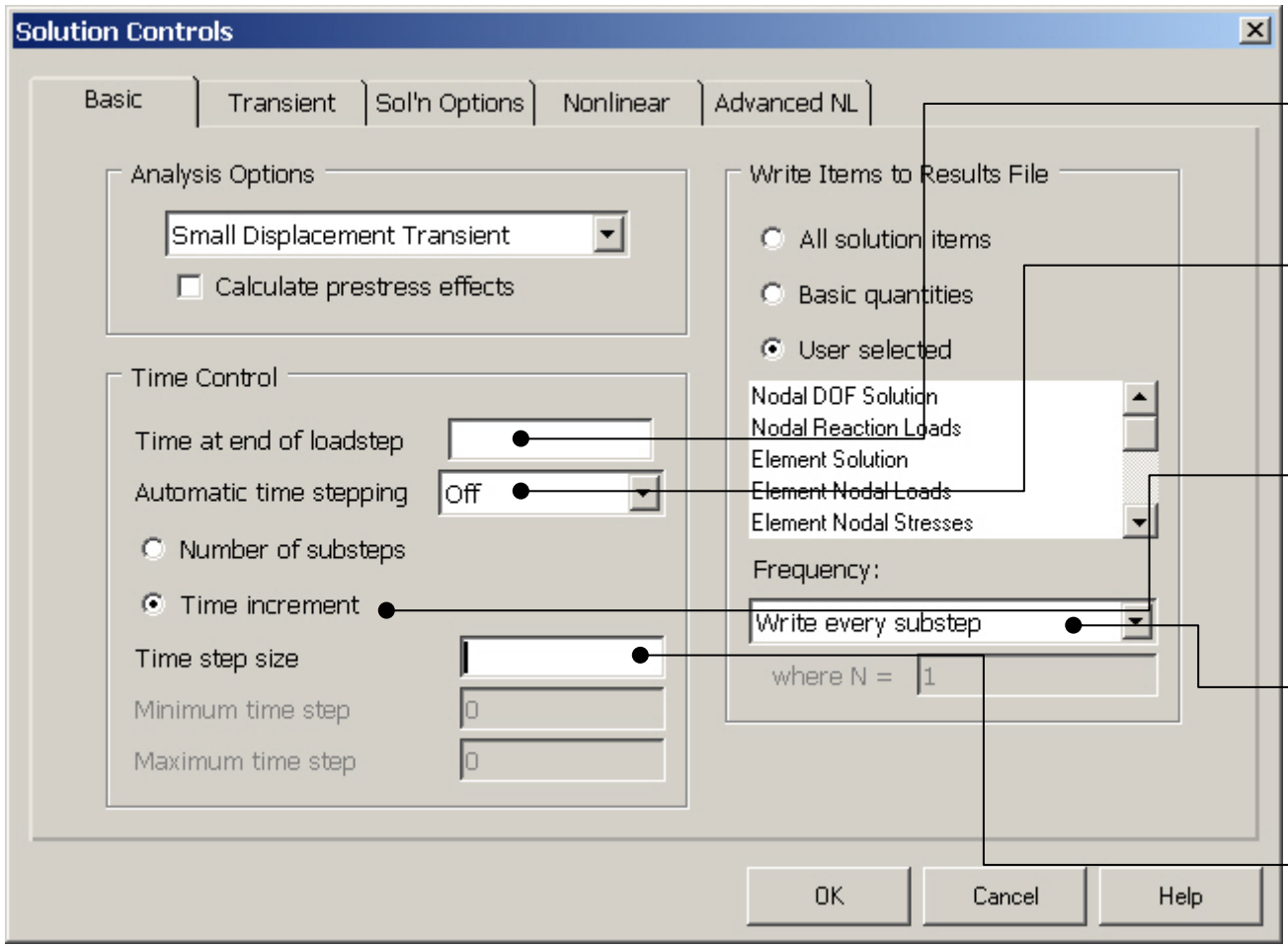


Example – Define Loads

Solution > Define Loads > Apply > Structural > Force/Moment > On Keypoints



Example – Solution Controls



Enter 0.0001

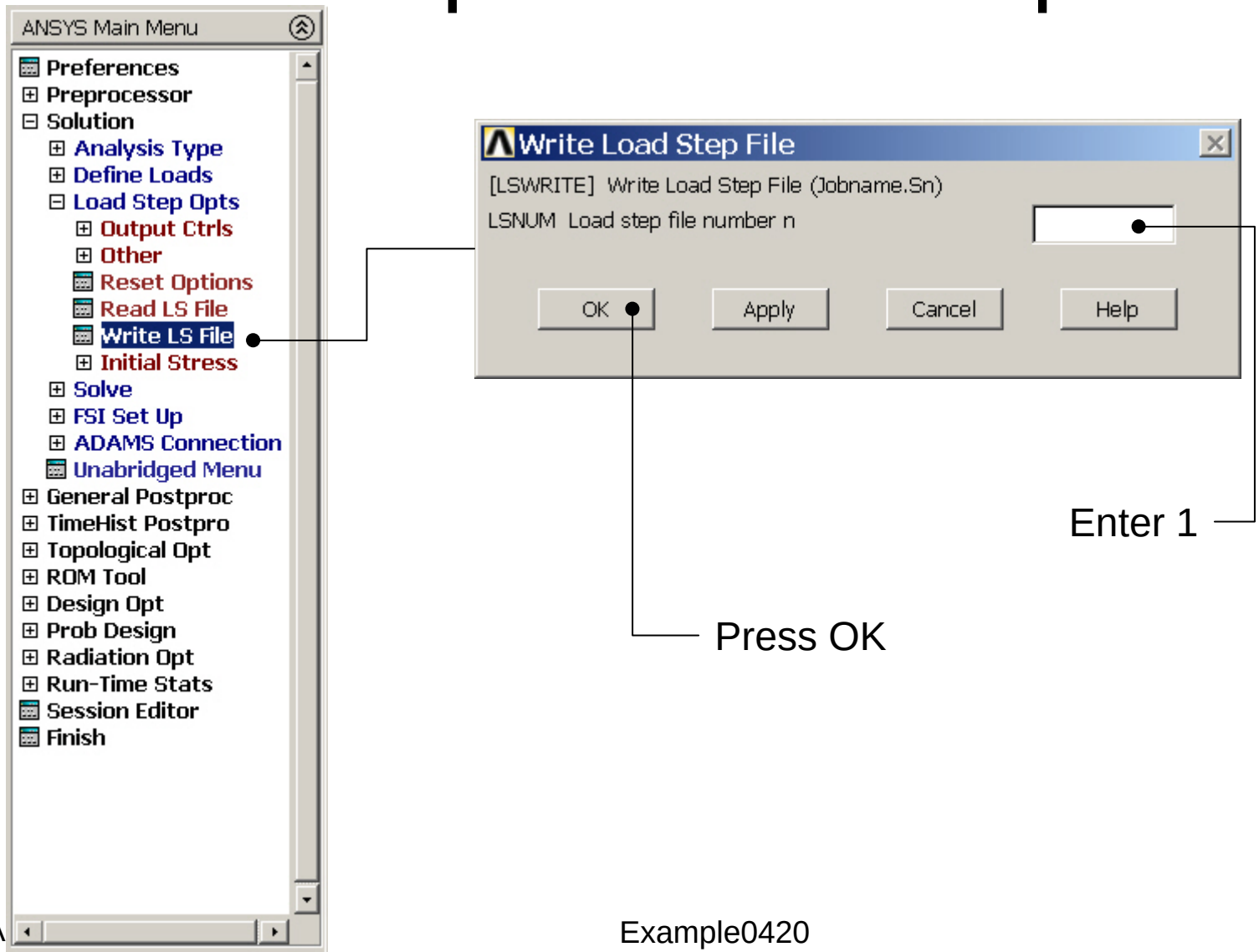
Set Automatic time stepping Off

Set to Time increment

Check if set to Write every substep

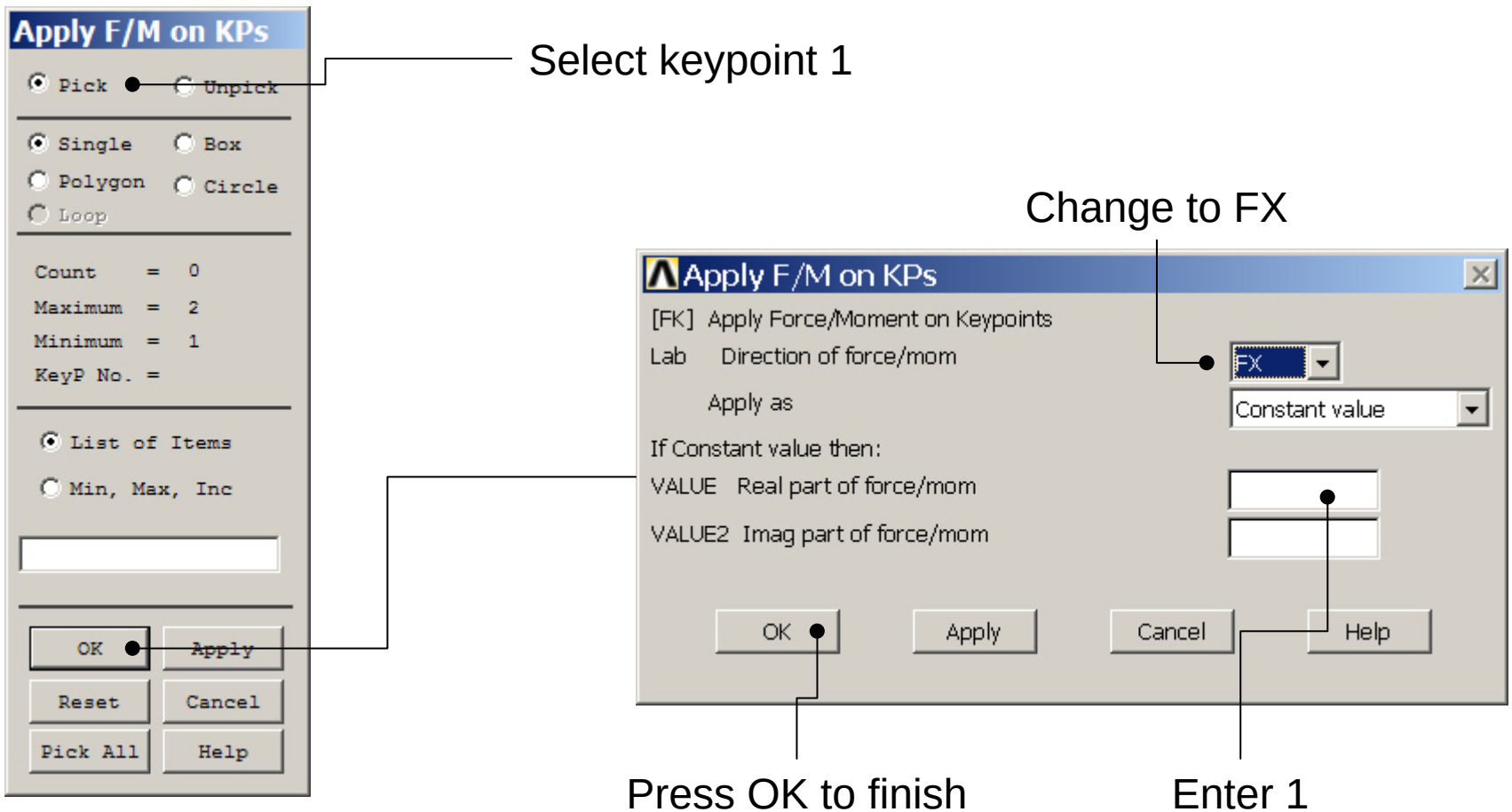
Enter 0.0001

Example – Loadstep file

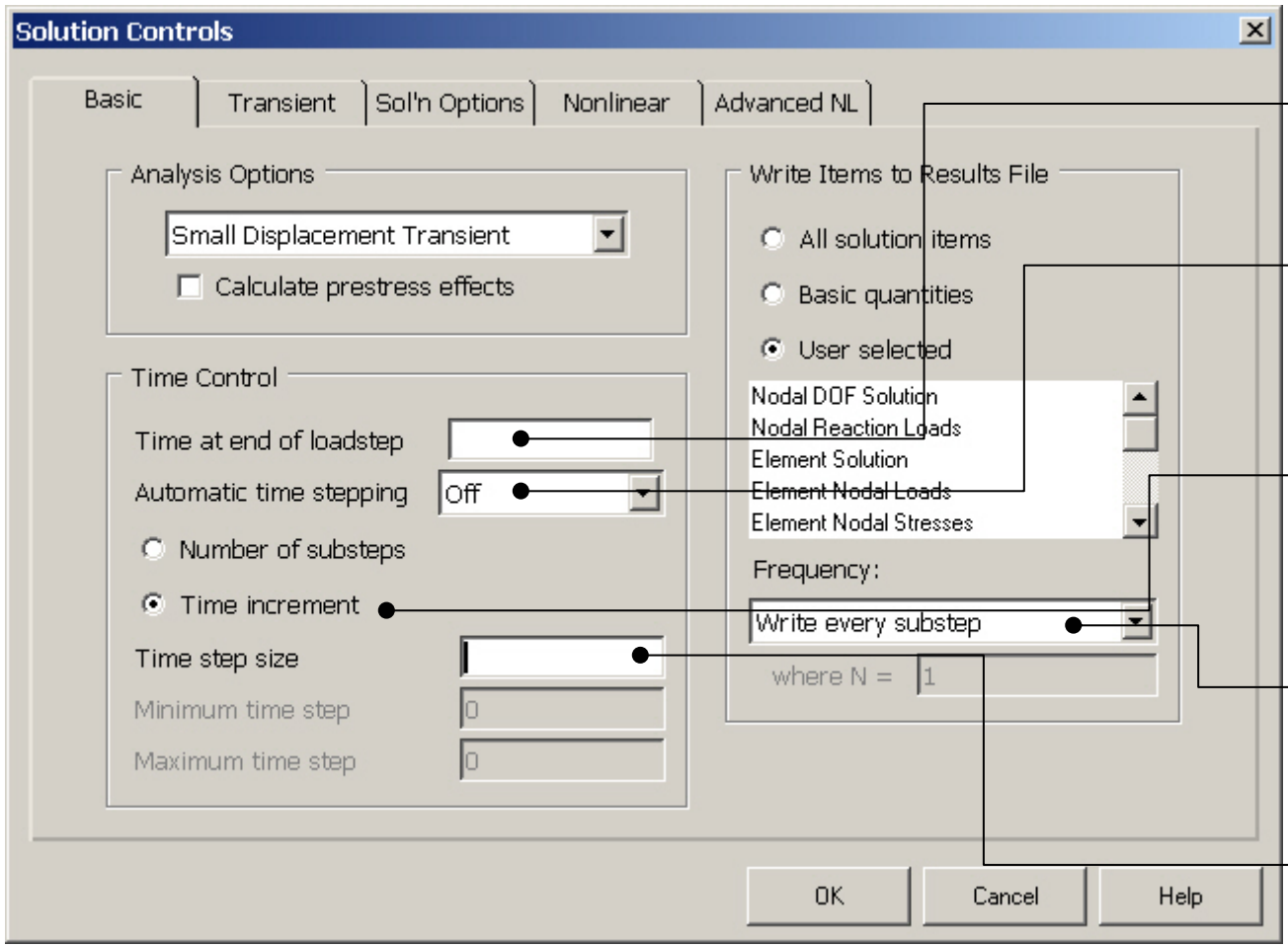


Example – Define Loads

Solution > Define Loads > Apply > Structural > Force/Moment > On Keypoints



Example – Solution Controls



Enter 30

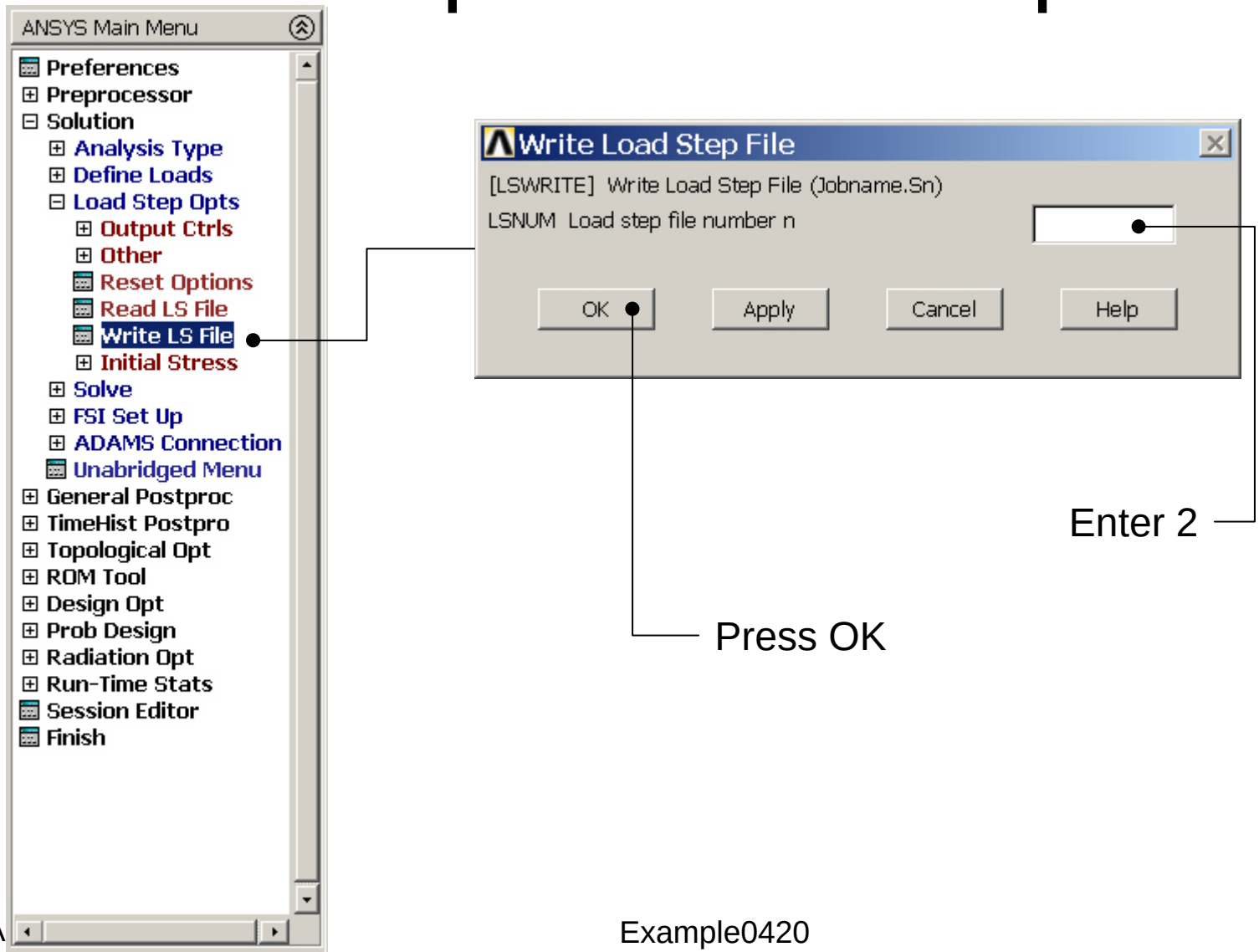
Set Automatic time stepping Off

Set to Time increment

Check if set to Write every substep

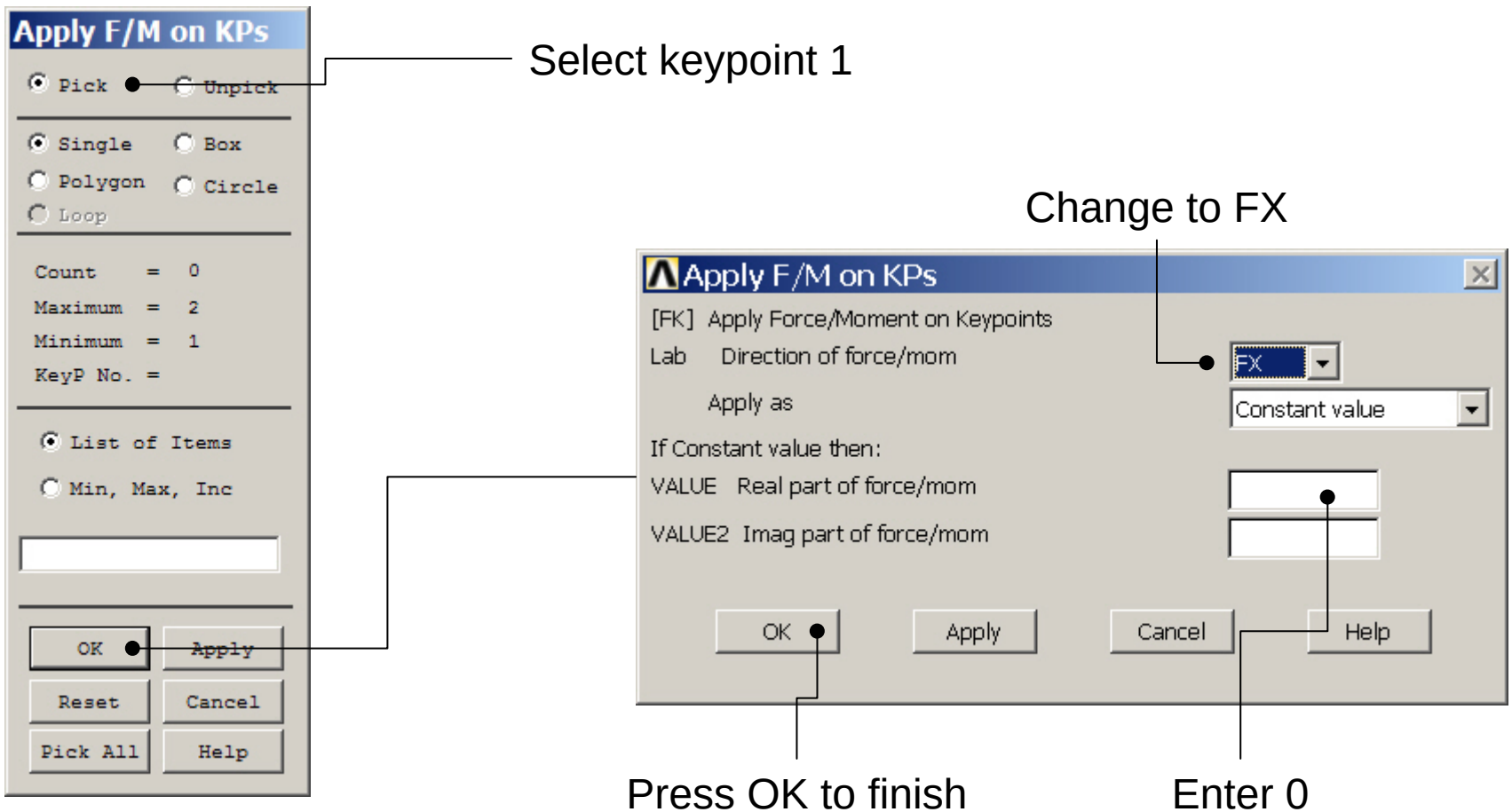
Enter 1

Example – Loadstep file

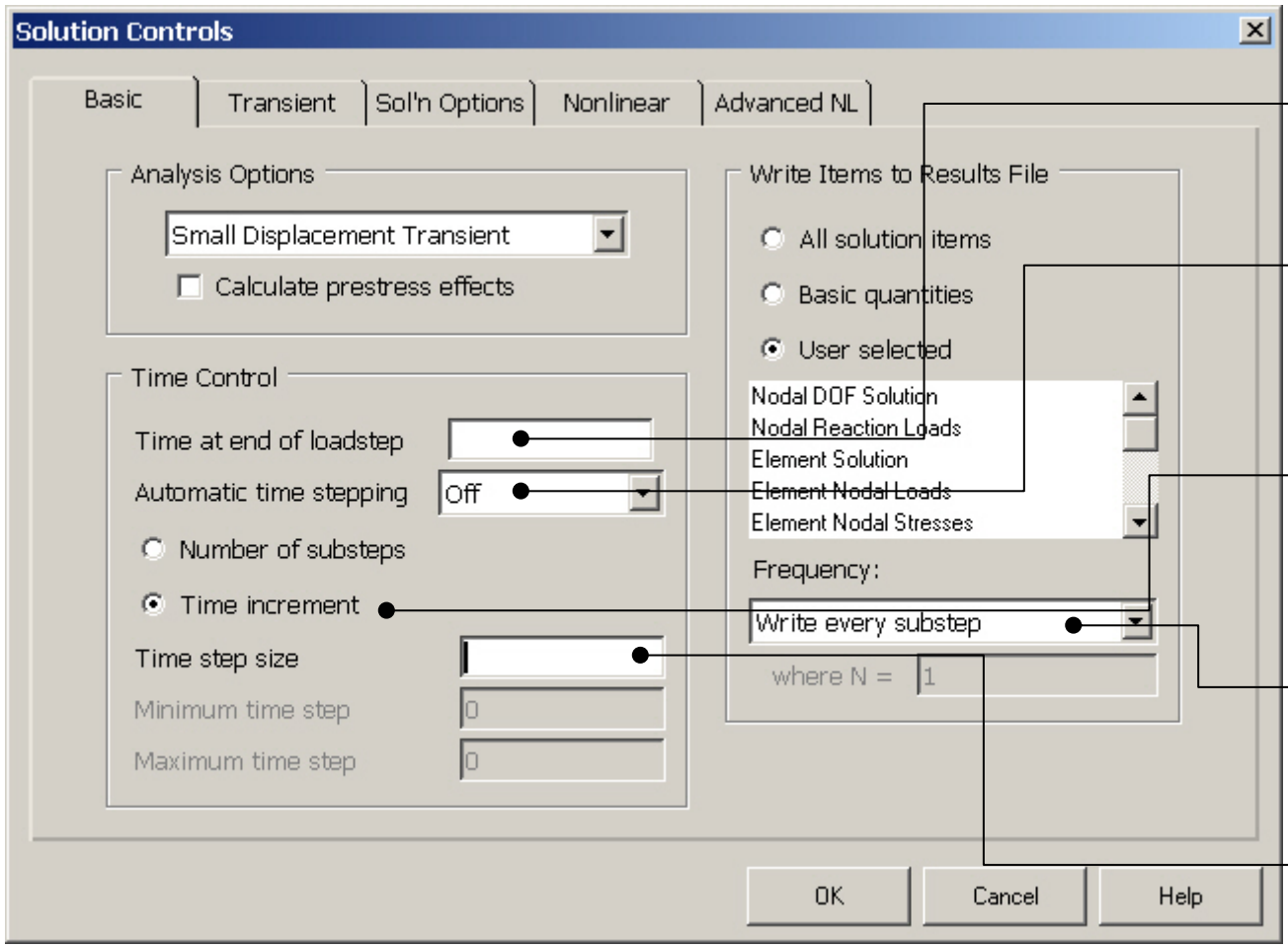


Example – Define Loads

Solution > Define Loads > Apply > Structural > Force/Moment > On Keypoints



Example – Solution Controls



Enter 30.001

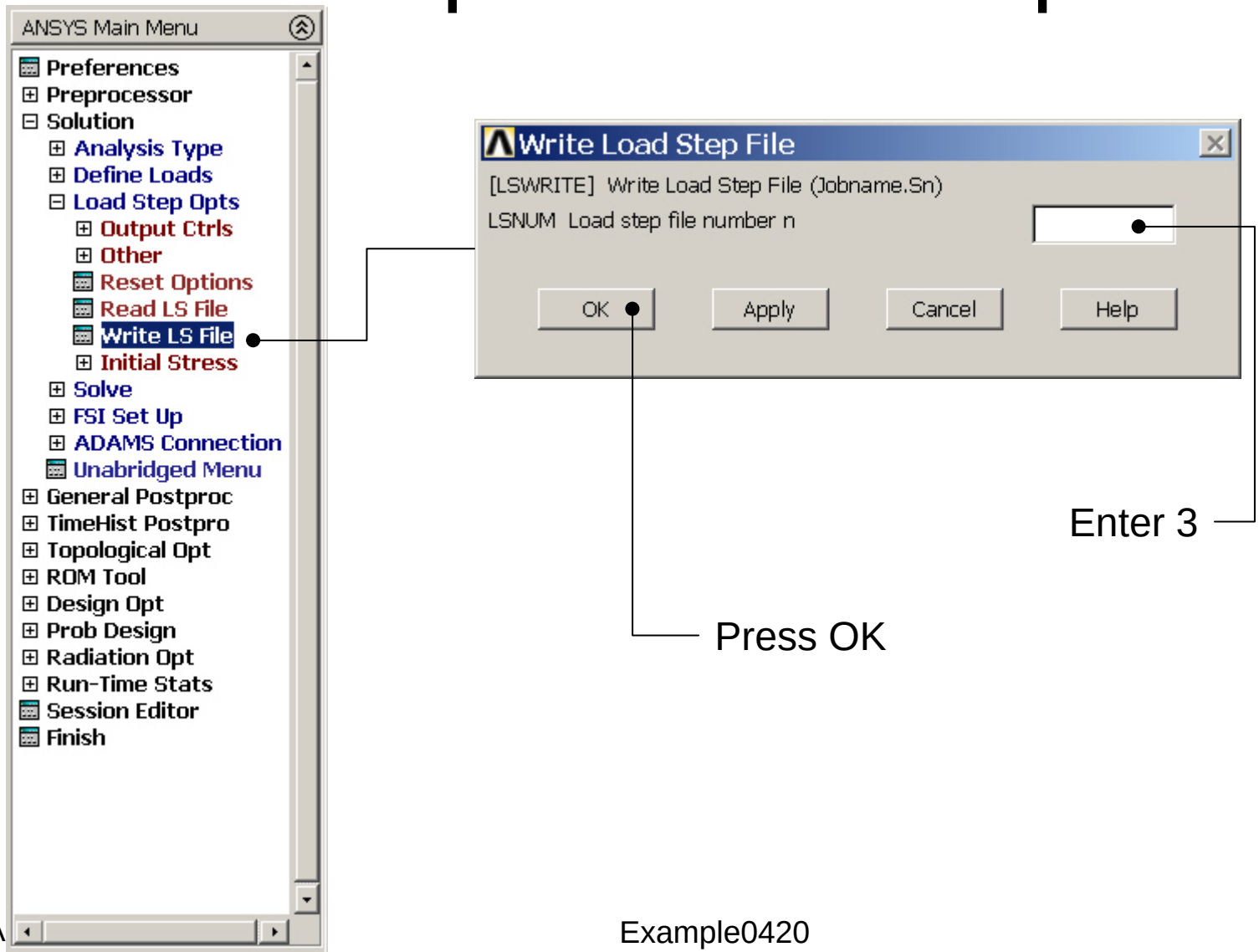
Set Automatic time stepping Off

Set to Time increment

Check if set to Write every substep

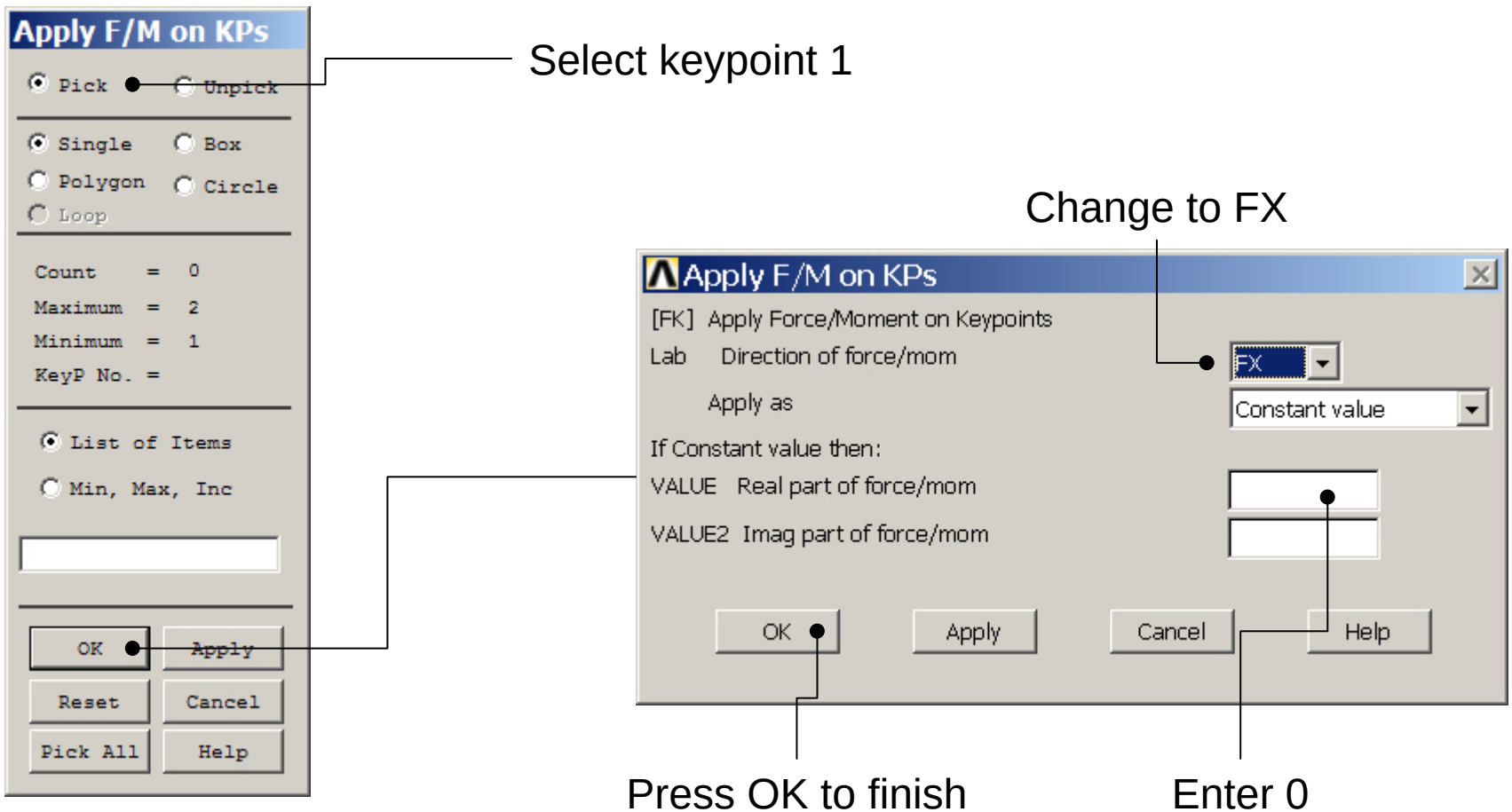
Enter 0.001

Example – Loadstep file

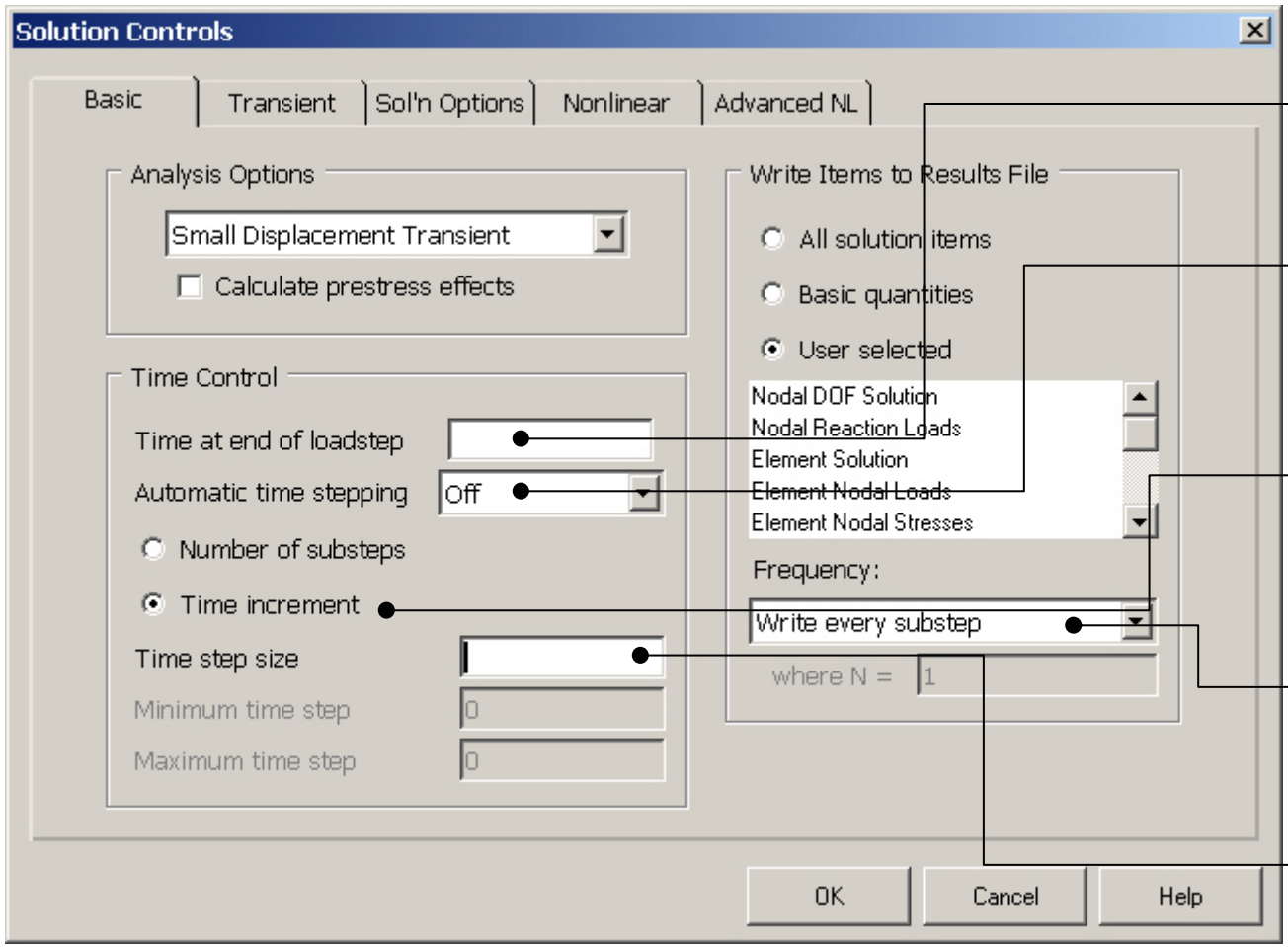


Example – Define Loads

Solution > Define Loads > Apply > Structural > Force/Moment > On Keypoints



Example – Solution Controls



Enter 250

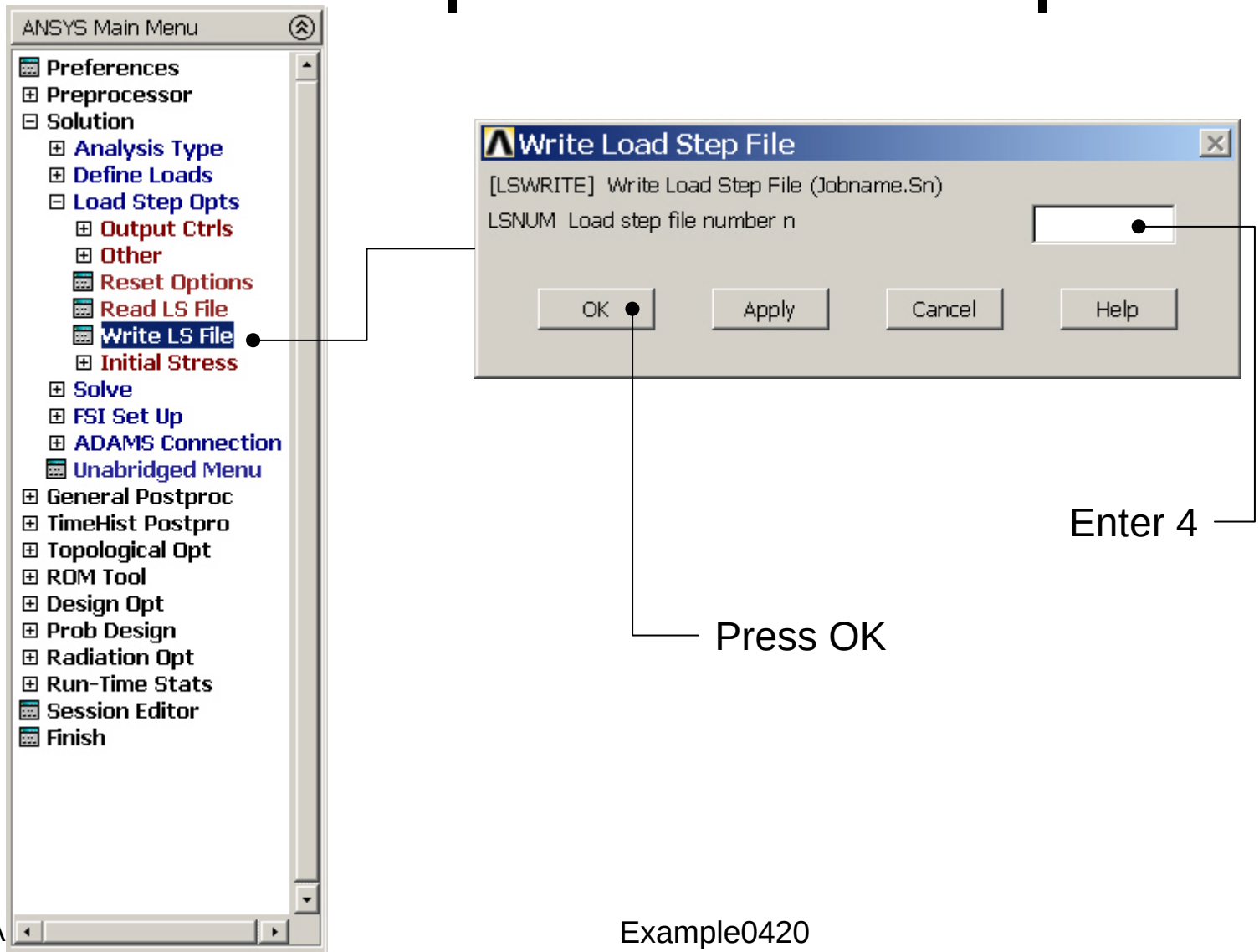
Set Automatic time stepping Off

Set to Time increment

Check if set to Write every substep

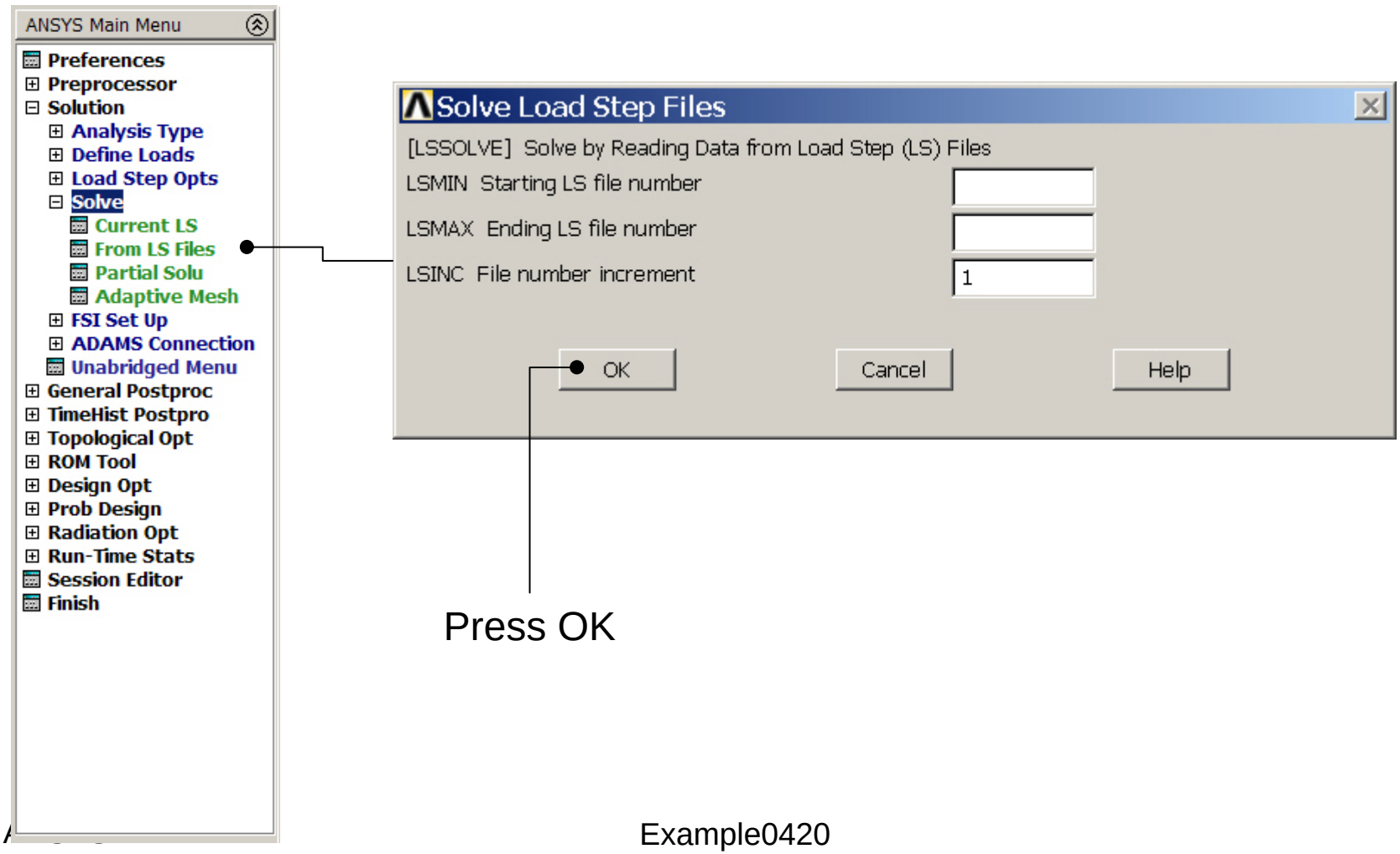
Enter 1

Example – Loadstep file

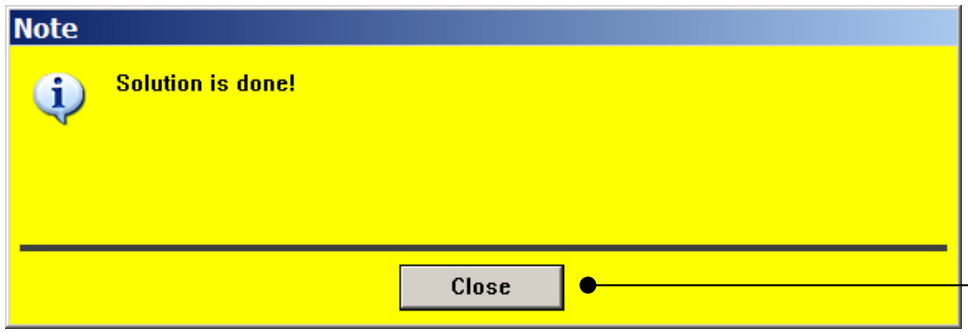


Example - Solve

Solution > Solve > From LS Files

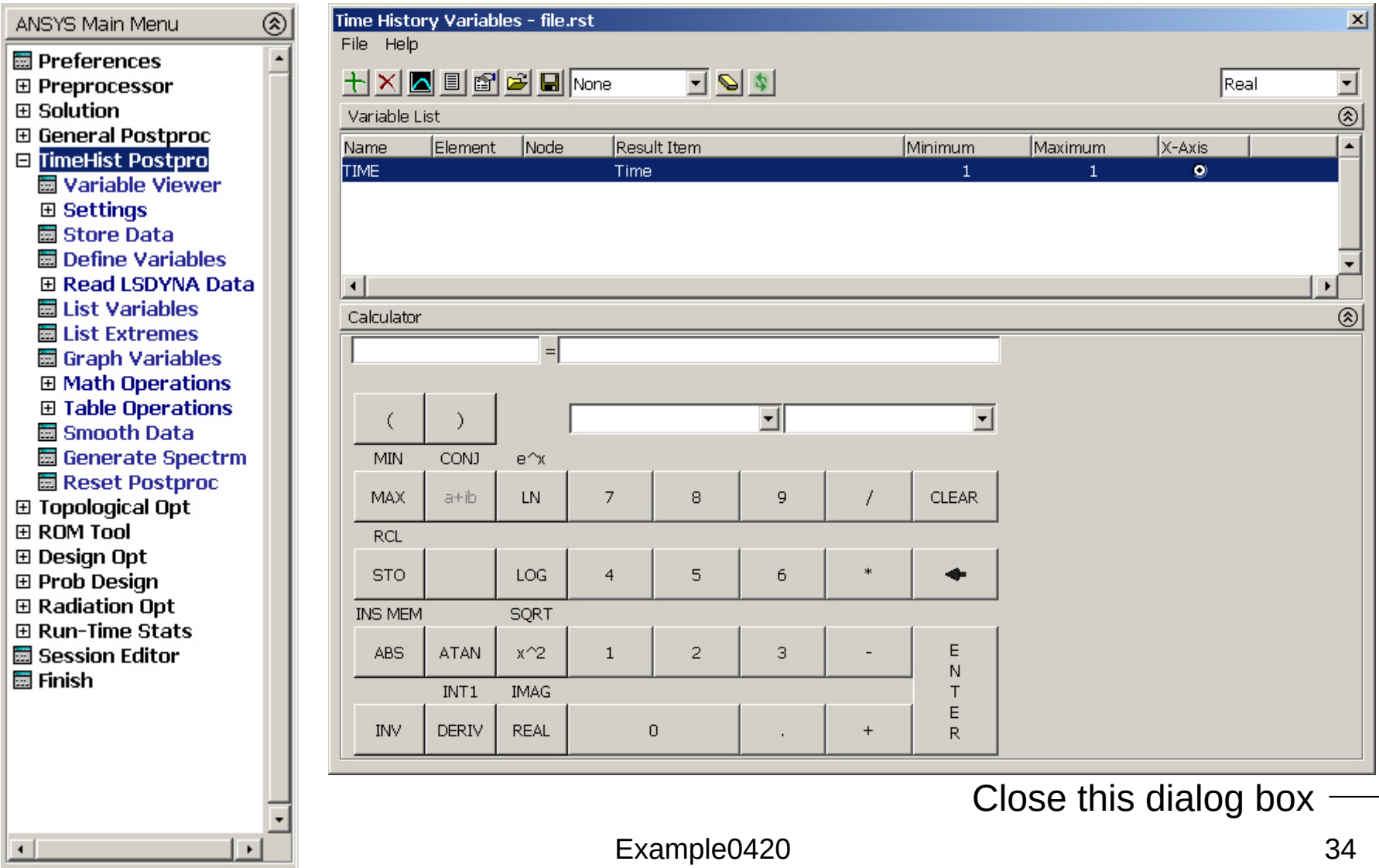


Example - Solve



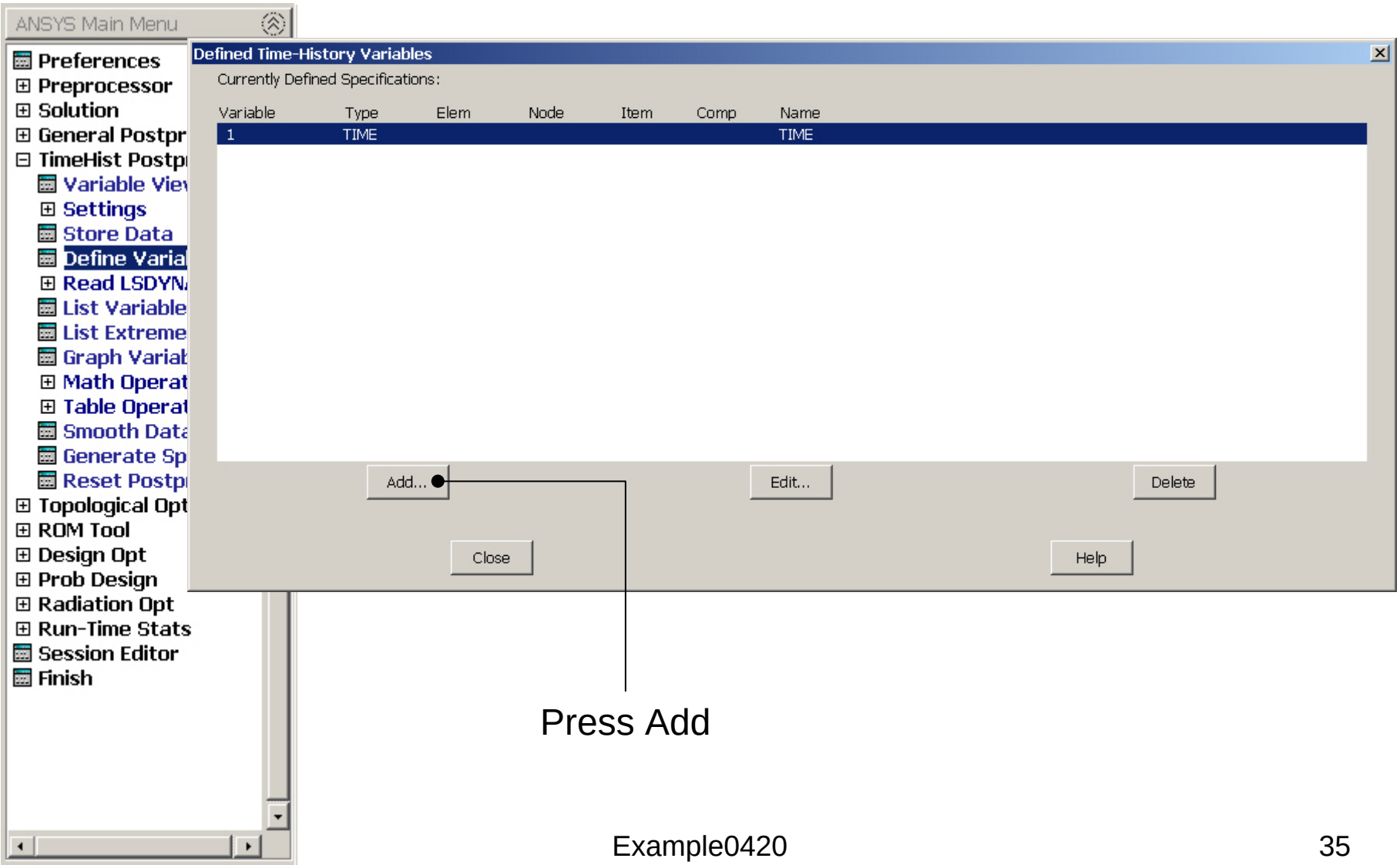
Press Close

Example – TimeHistory Postpro



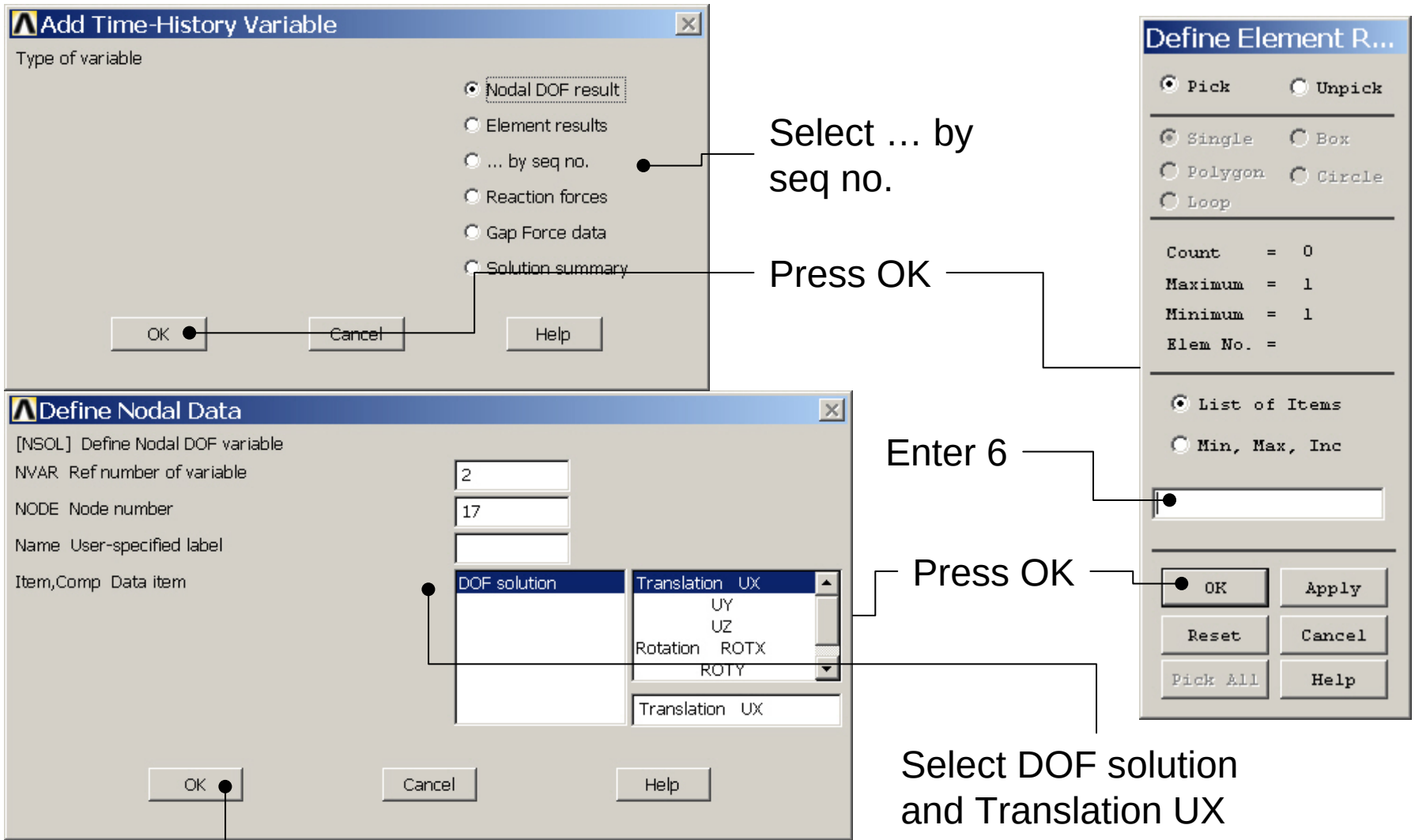
Close this dialog box

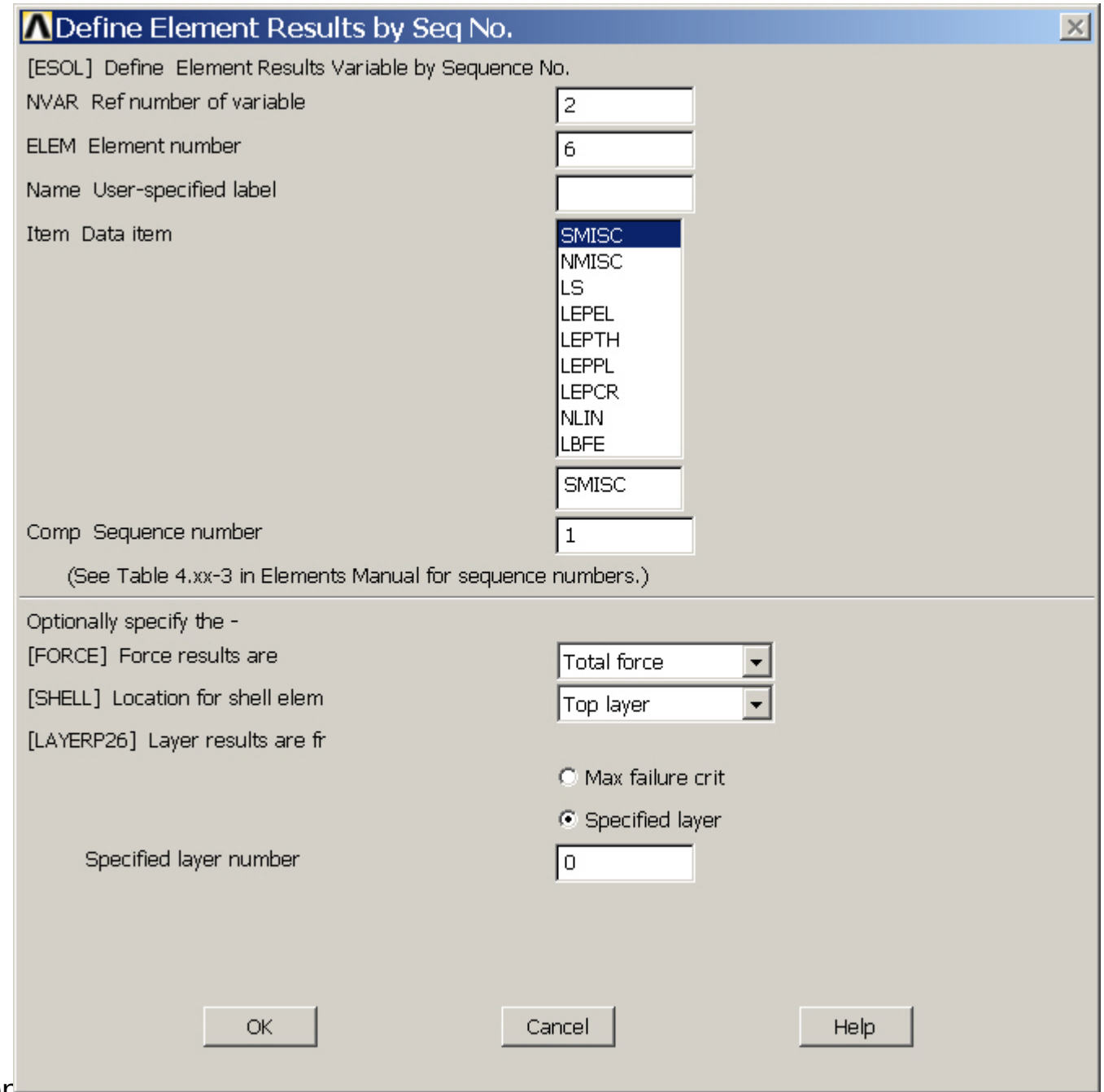
Example – Define Variables

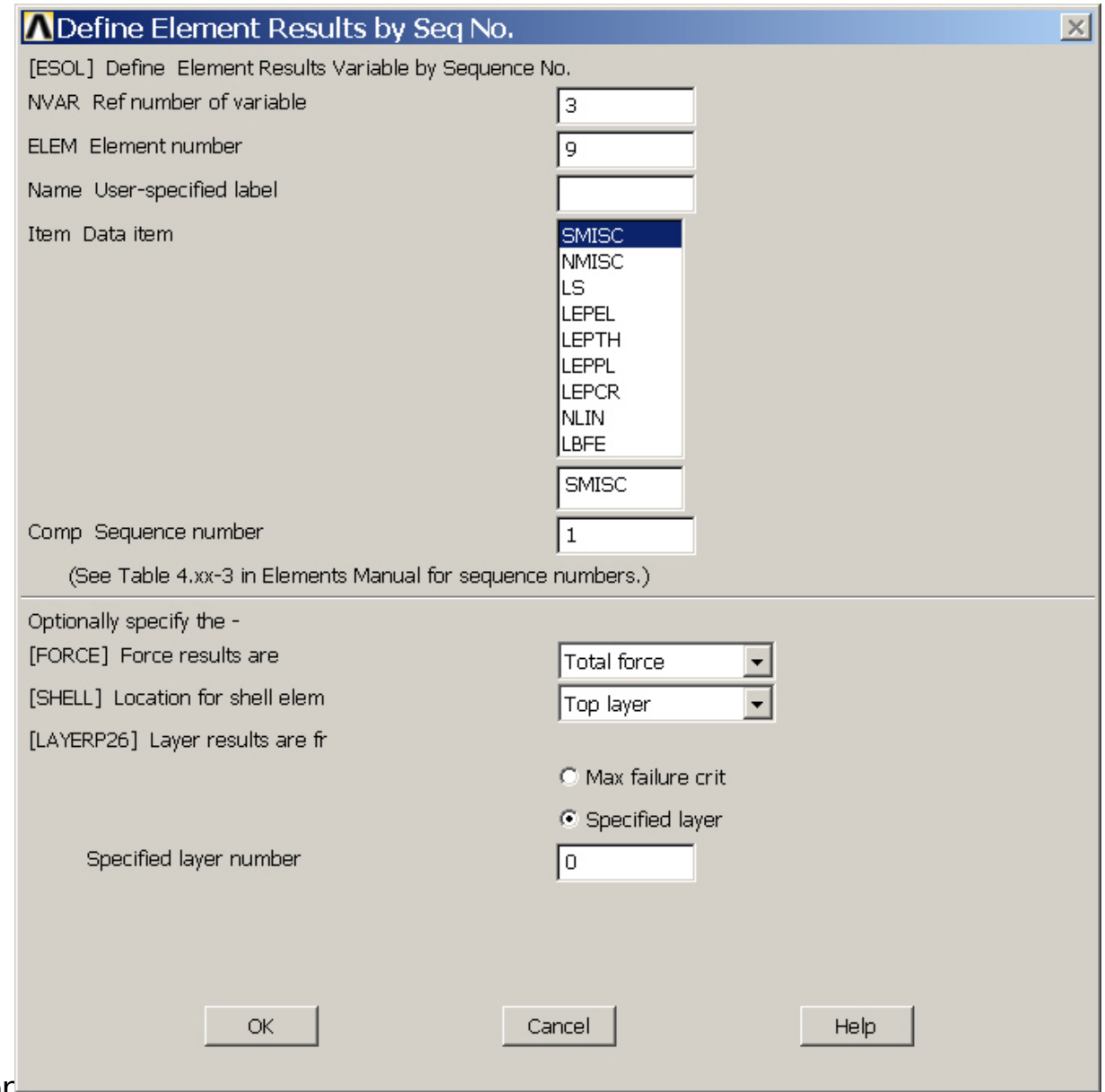


Press Add

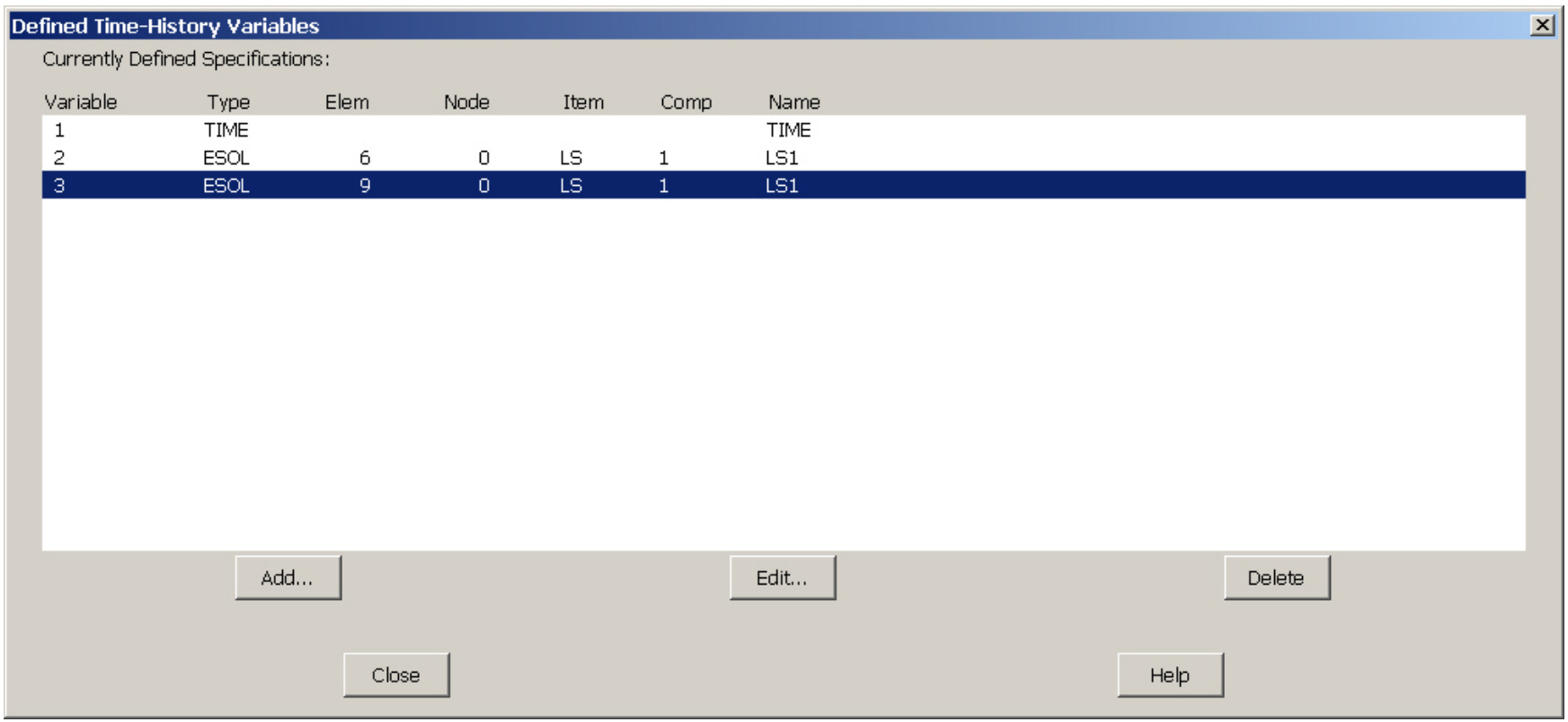
Example – Add Time-History Var.



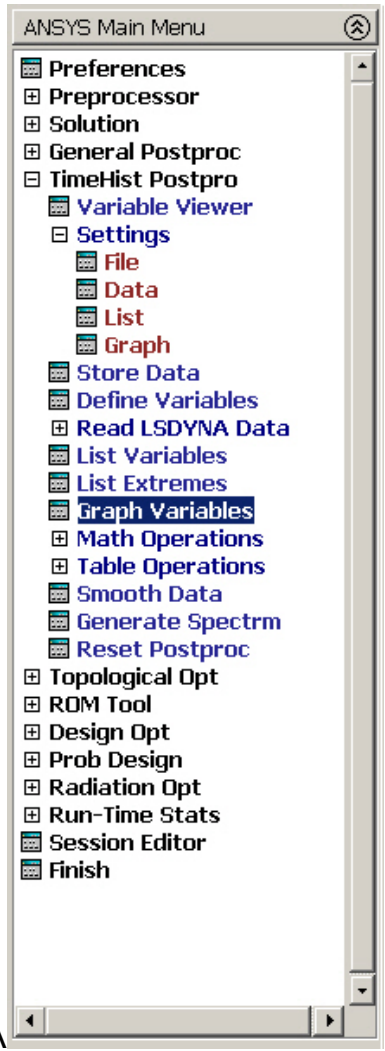

Define Element Results by Seq No.
[ESOL] Define Element Results Variable by Sequence No.
NVAR Ref number of variable
2
ELEM Element number
6
Name User-specified label
Item Data item
SMISC
NMISC
LS
LEPEL
LEPTH
LEPPL
LEPCR
NLIN
LBFE
SMISC
Comp Sequence number
1
(See Table 4.xx-3 in Elements Manual for sequence numbers.)
Optionally specify the -
[FORCE] Force results are
Total force
[SHELL] Location for shell elem
Top layer
[LAYERP26] Layer results are fr
Max failure crit
Specified layer
Specified layer number
0
OK
Cancel
Help

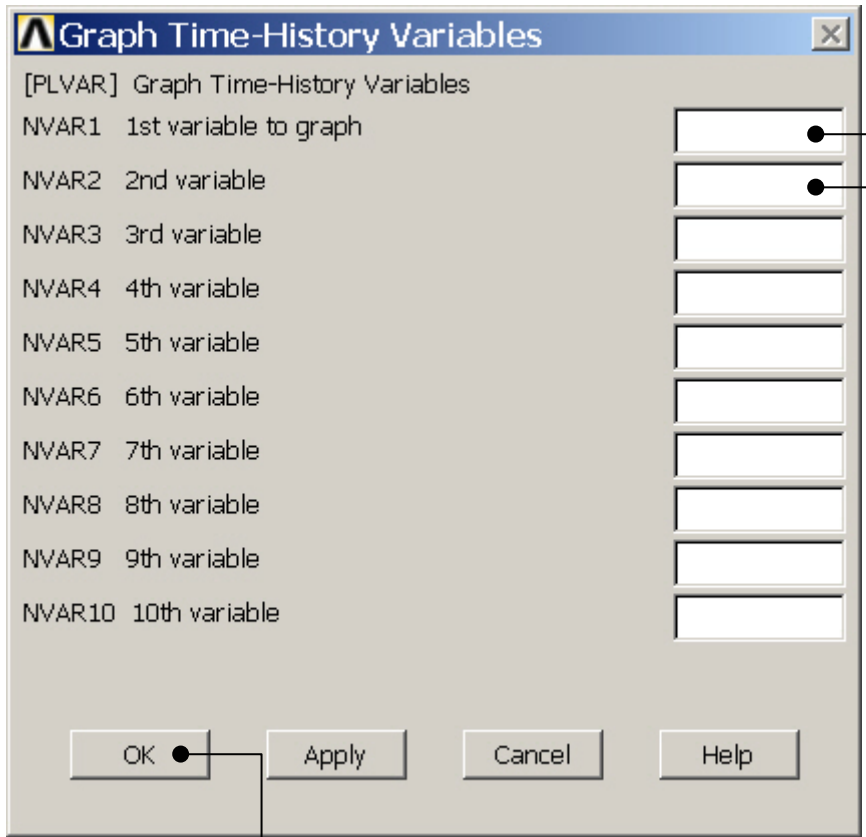

Define Element Results by Seq No.
[ESOL] Define Element Results Variable by Sequence No.
NVAR Ref number of variable
3
ELEM Element number
9
Name User-specified label
Item Data item
SMISC
NMISC
LS
LEPEL
LEPTH
LEPPL
LEPCR
NLIN
LBFE
SMISC
Comp Sequence number
1
(See Table 4.xx-3 in Elements Manual for sequence numbers.)
Optionally specify the -
[FORCE] Force results are
Total force
[SHELL] Location for shell elem
Top layer
[LAYERP26] Layer results are fr
Max failure crit
Specified layer
Specified layer number
0
OK
Cancel
Help

Example – Add Time-History Var.



Example – Graph Variables





Enter 2

Enter 3

Press OK

Example – Graph Variables