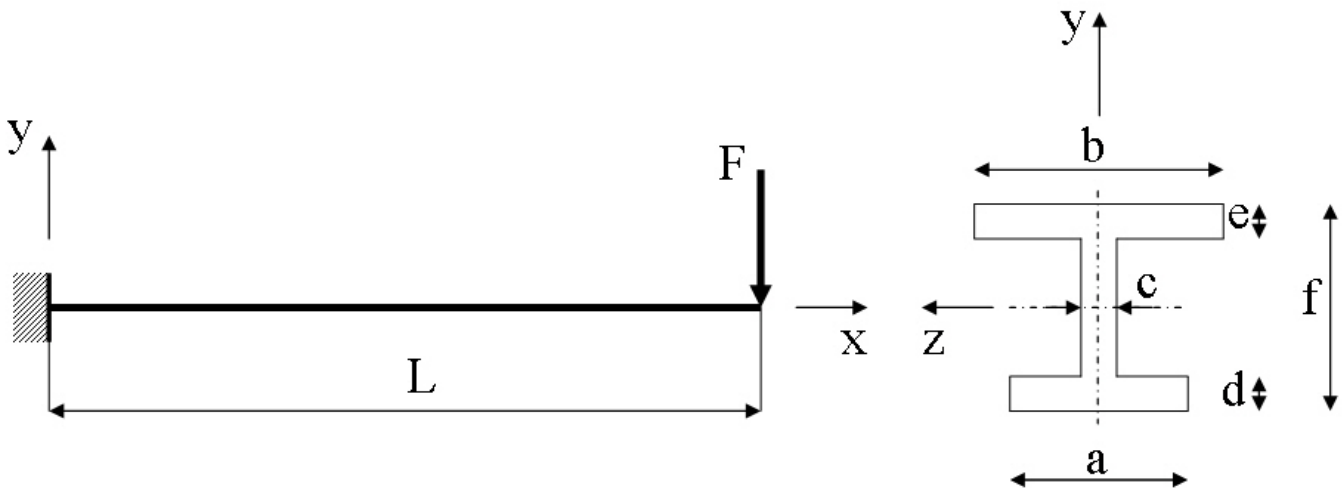
Course in ANSYS

Example0511

Example – Cantilever beam



Objective:
Plot the P-U curve for the nonlinear behaviour
Tasks:
Obtain a static solution including prestress
Obtain a buckling solution
Include imperfections using Update Geometry
Run the nonlinear analysis

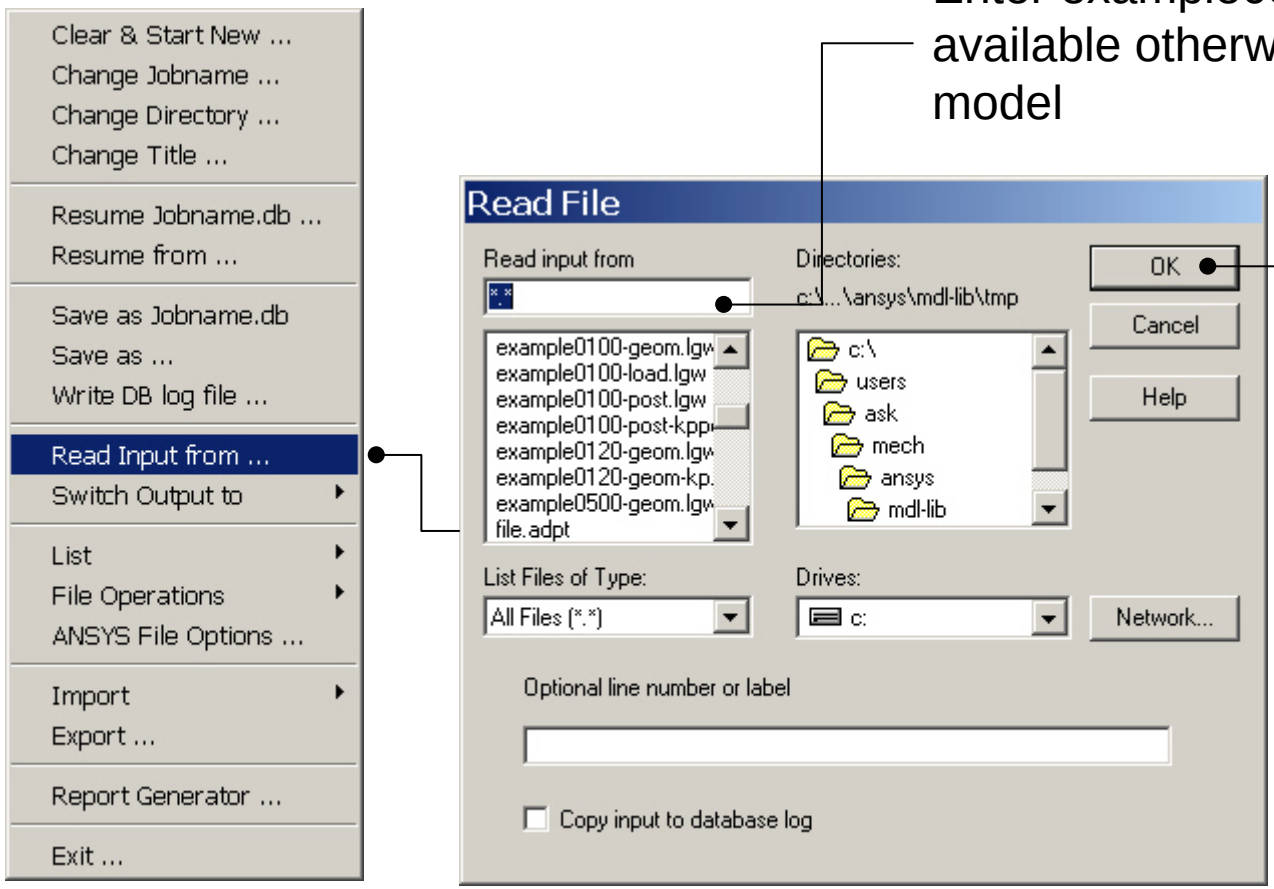
$E = 210000 N/mm^2$
$\nu = 0.3$
L = 5000mm
a = 250mm
b = 450mm
c = 10mm
d = 20mm
e = 15mm
f = 350mm
F = ?

Nonlinear - Solution Phases

- Tasks
  - Run a static analysis with Prestress ON
  - Run a Eigen Buckling analysis with a unit load
    - ExpansionPass ON
  - Save the model
  - Finish the Solution process
  - Plot results
  - Update geometry for a relevant buckling mode
  - In place of the unit load apply a load with a magnitude of the buckling load found for a relevant buckling mode
  - Run a static nonlinear analysis
  - Plot appropiate deformations vs. forces

We start here

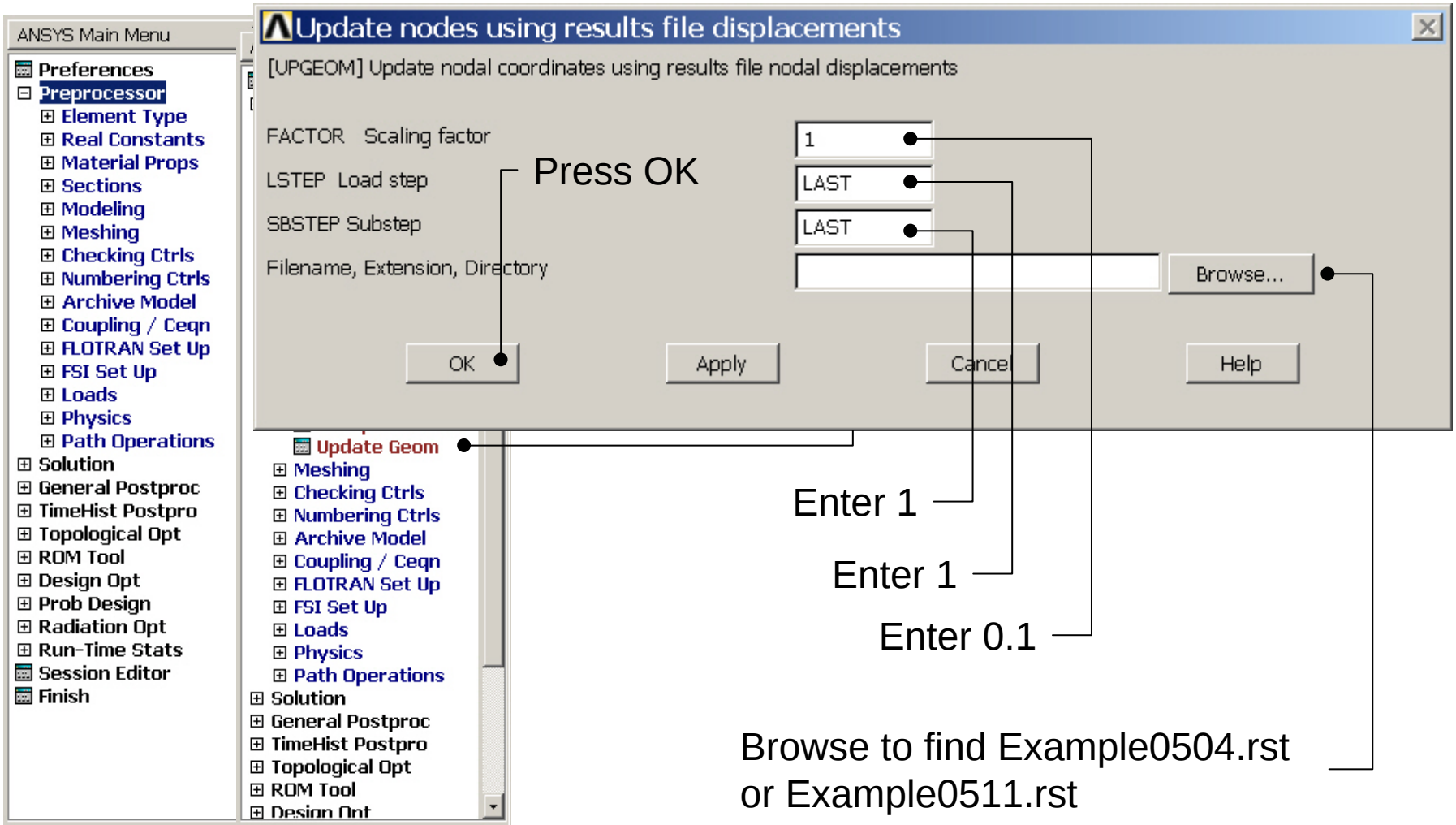
Example – Read Input from..



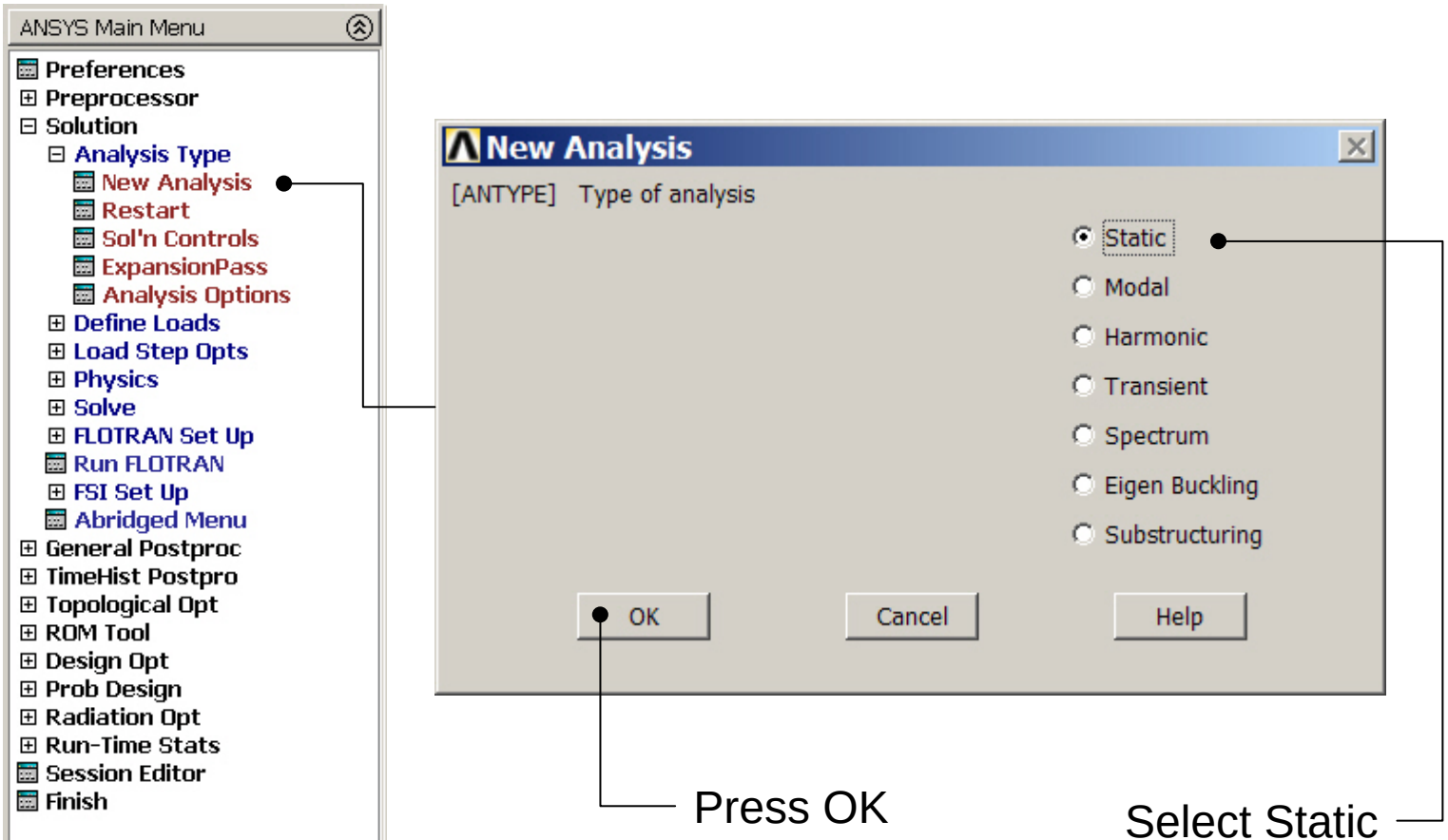
Enter example0504.lgw if available otherwise rebuild the model

Press OK

Example - Update Geom

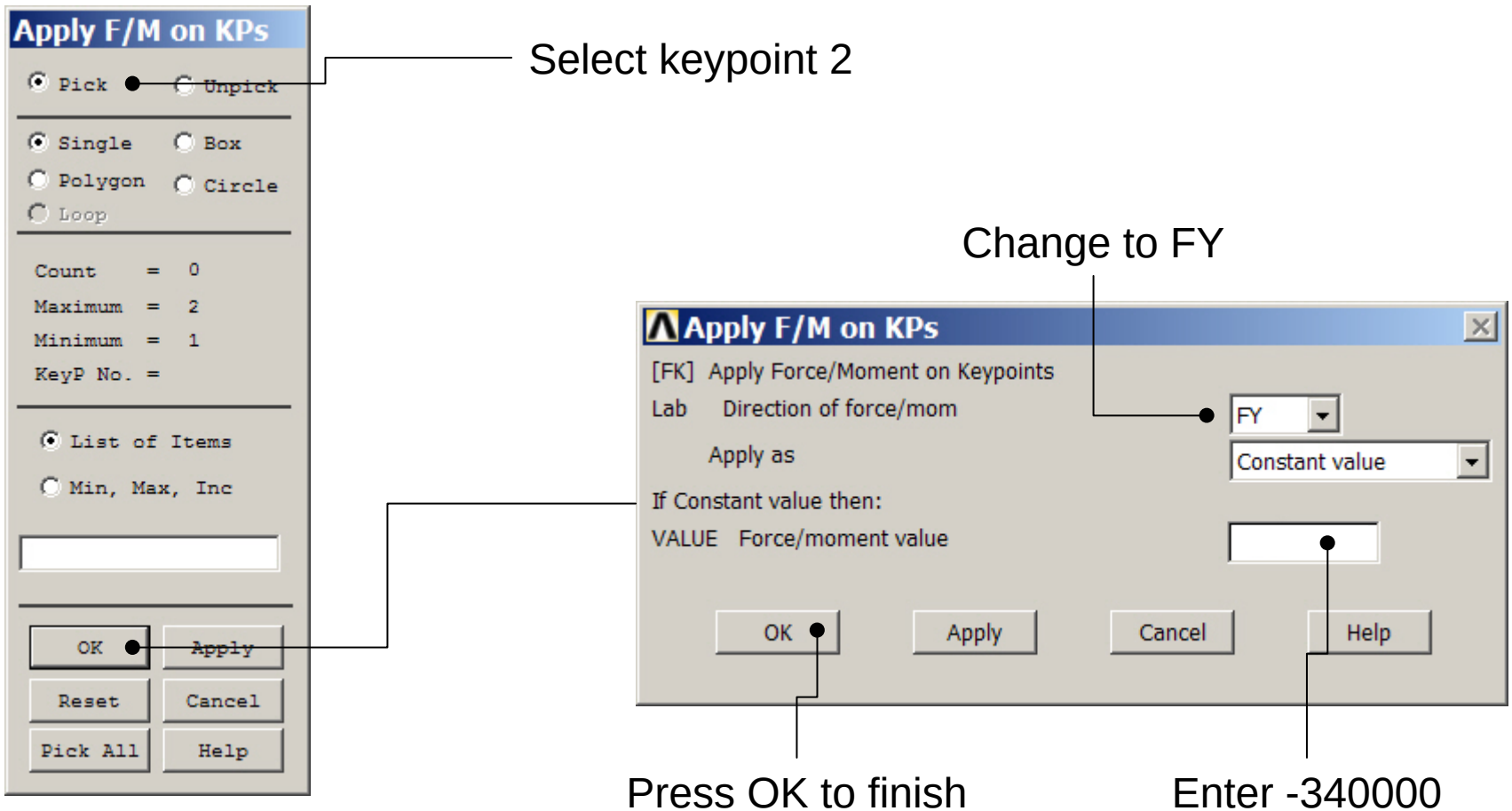


Example – Analysis Type

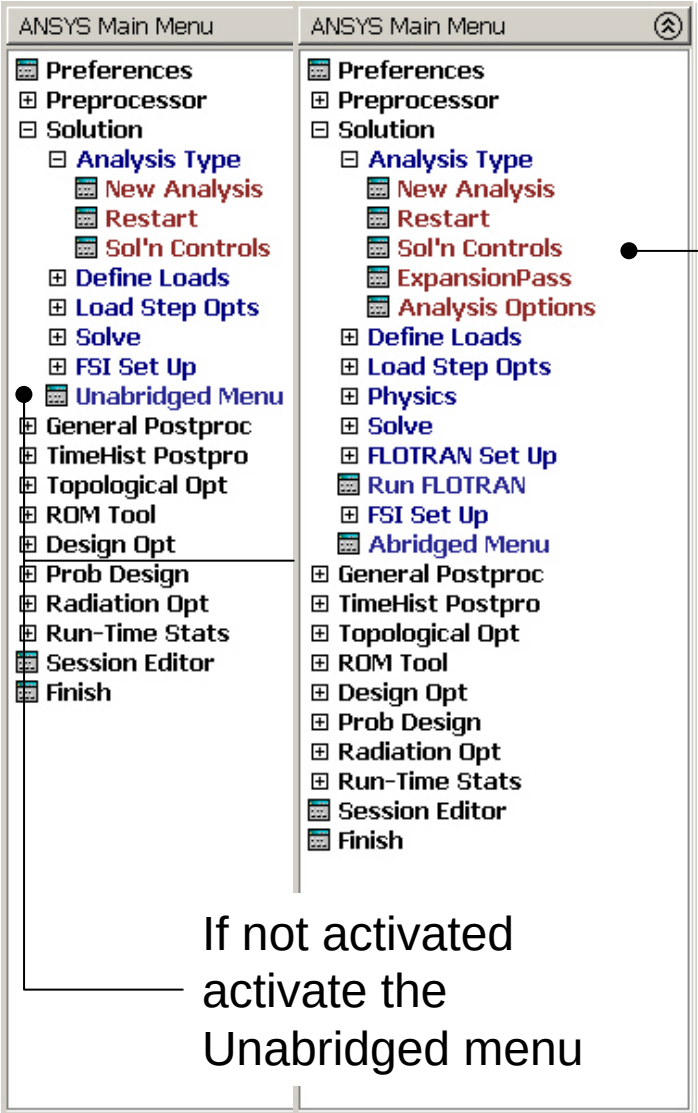


Example – Define Loads

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



Static solution – Analysis Options

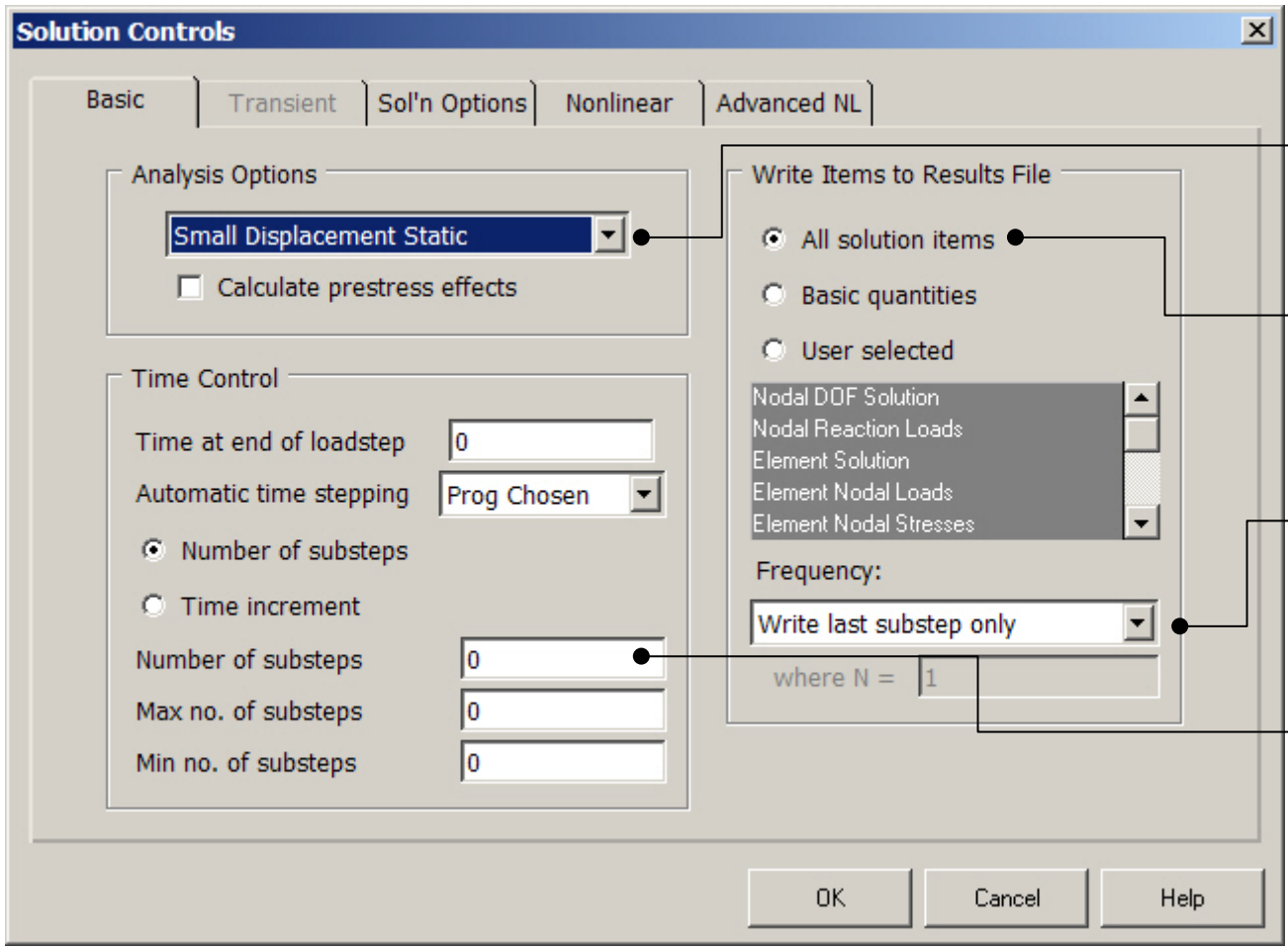


Select Sol'n Controls

If not activated activate the Unabridged menu

Example0511

Example – Solution Controls



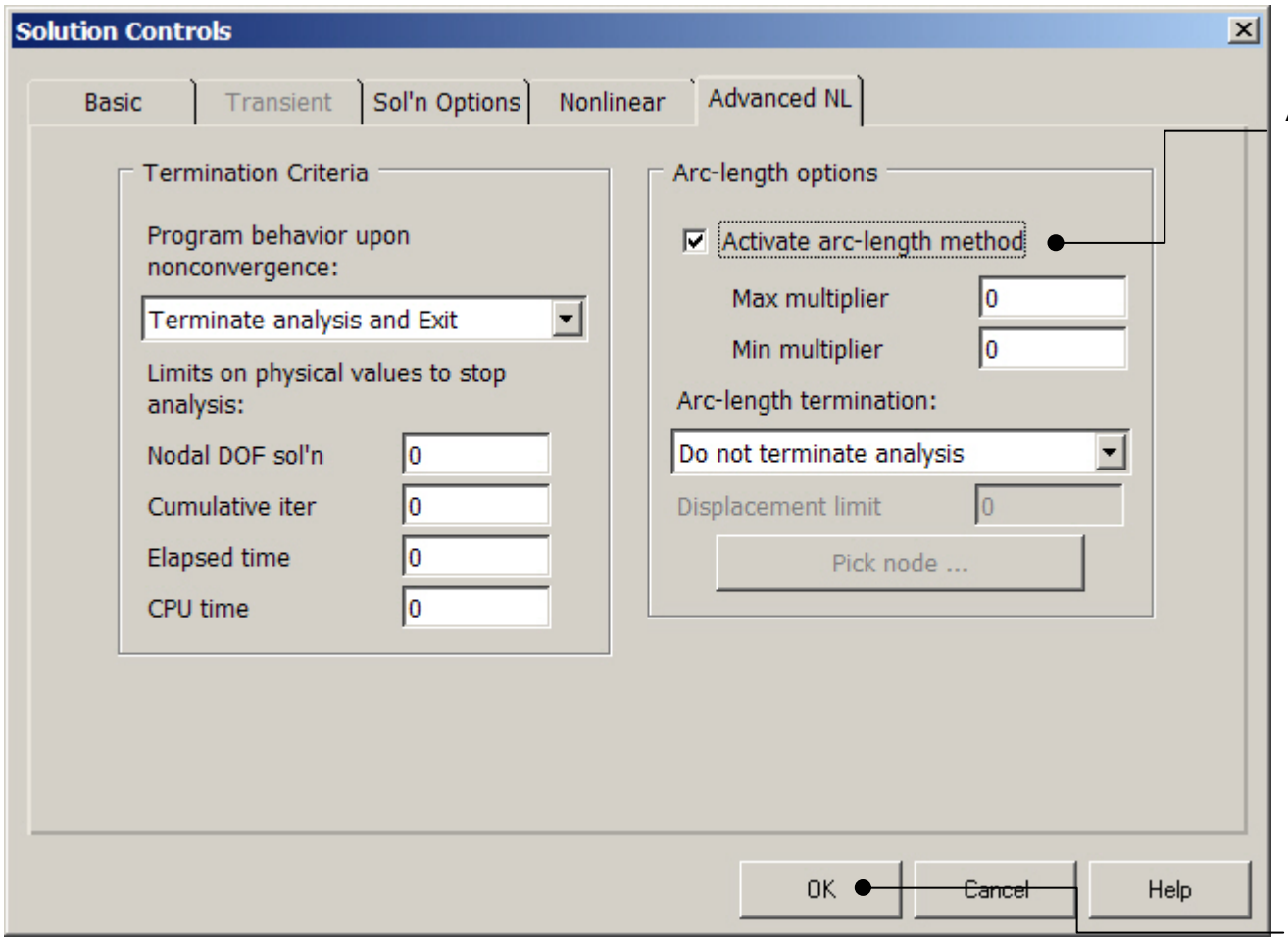
Change to Large Displacement Static

Select All solution items

Select Write every Nth substeps

Enter 30

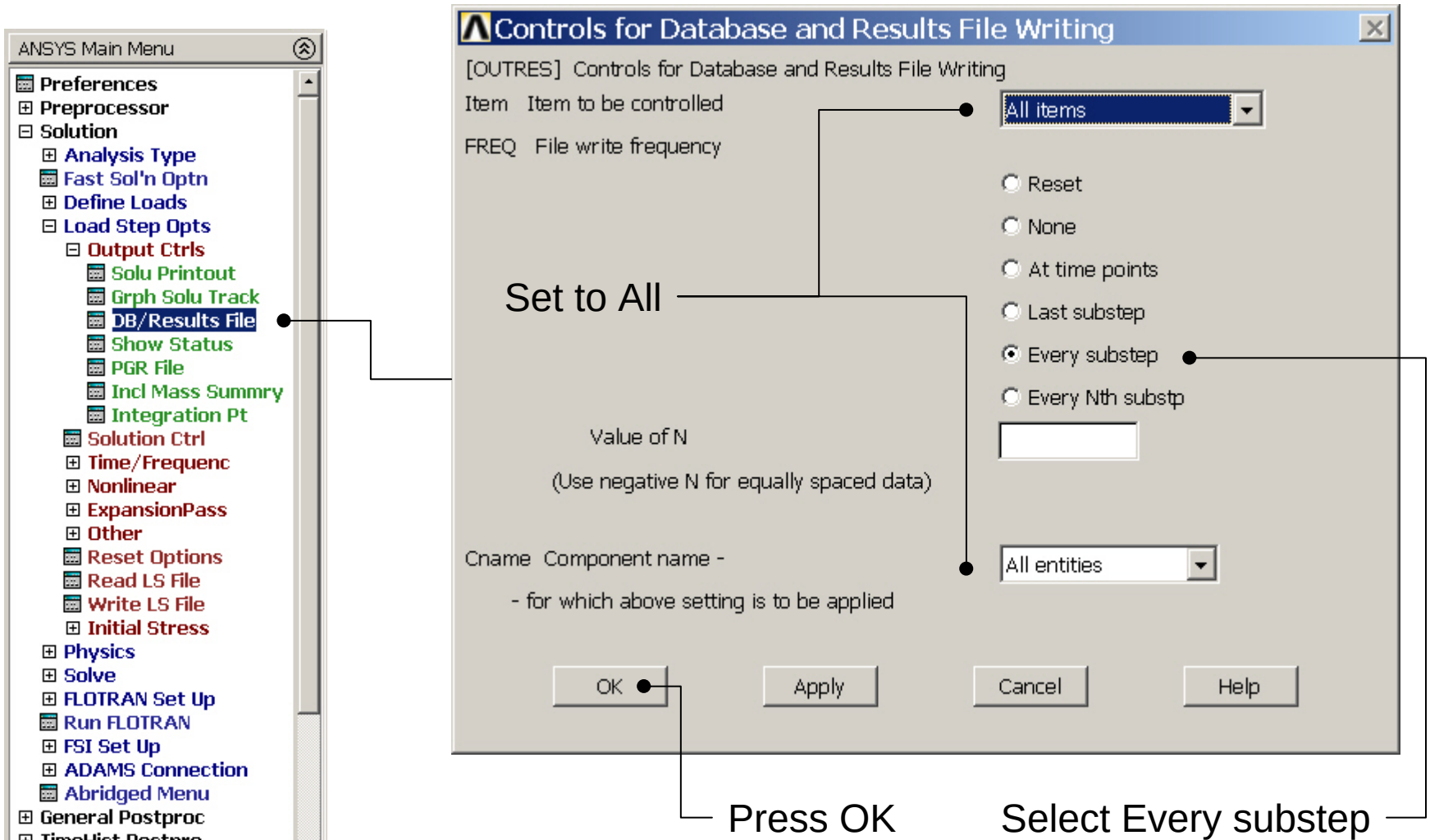
Example – Solution Controls



Activate the arc-length method

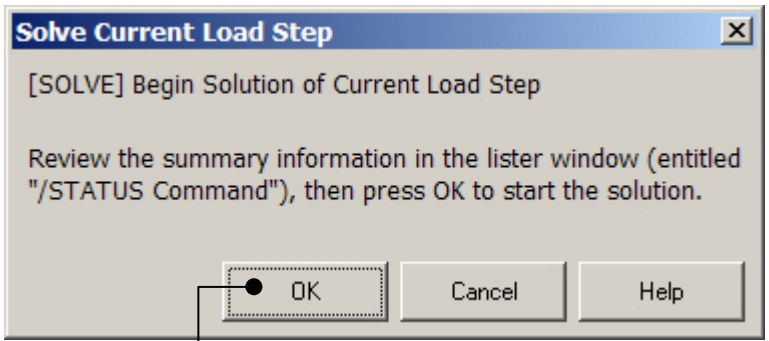
Press OK

Example – Output Ctrls



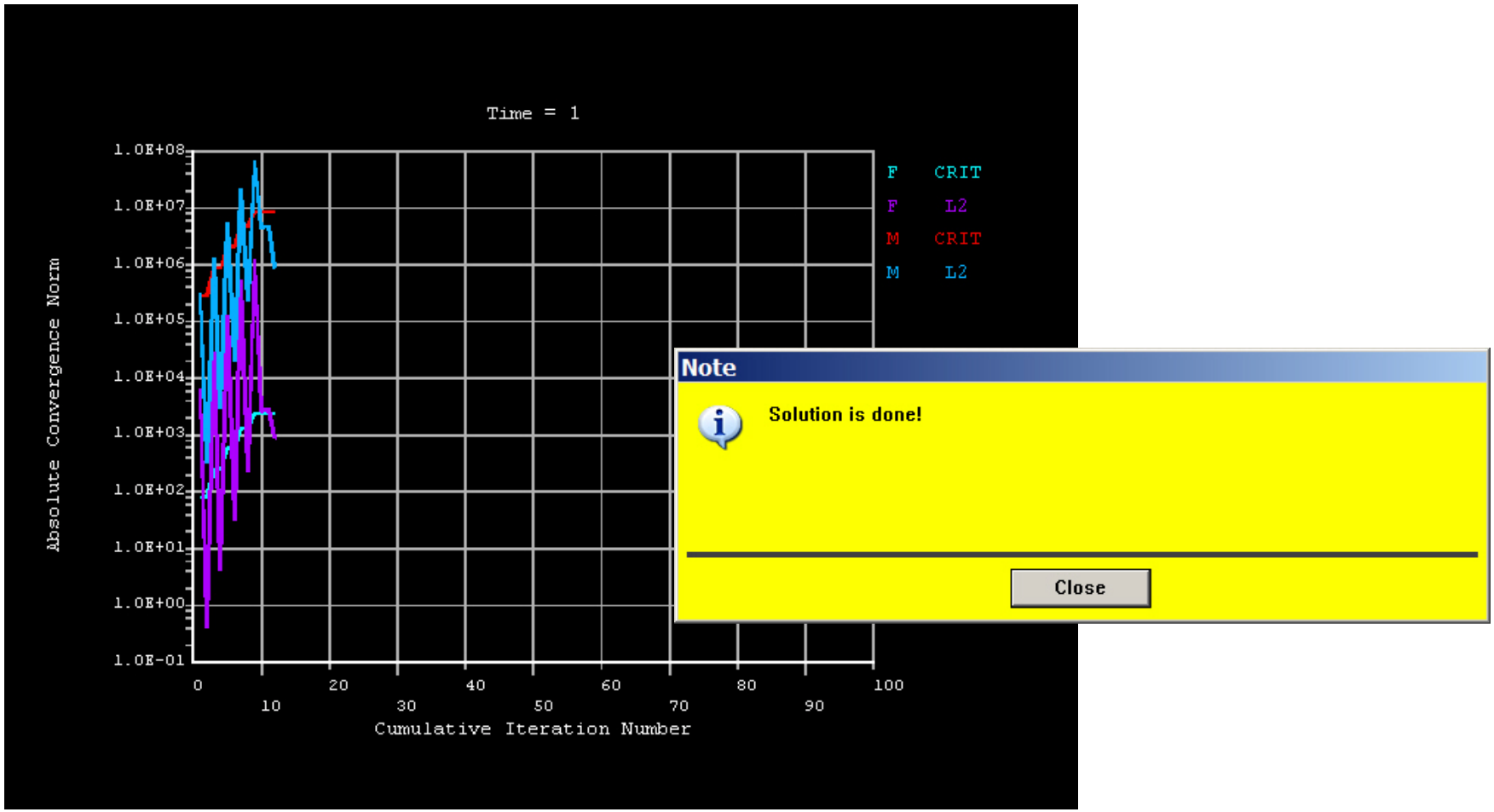
Example - Solve

Solution > Solve > Current LS

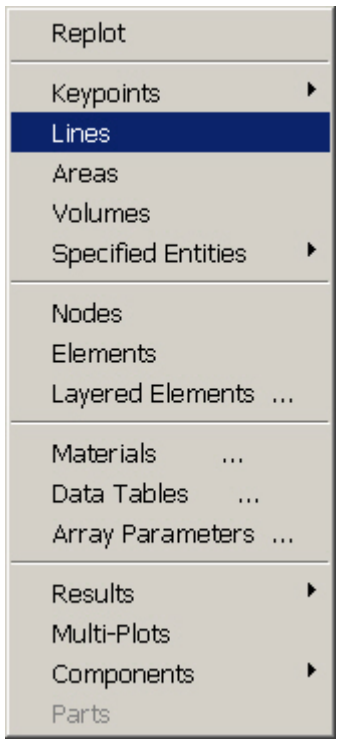


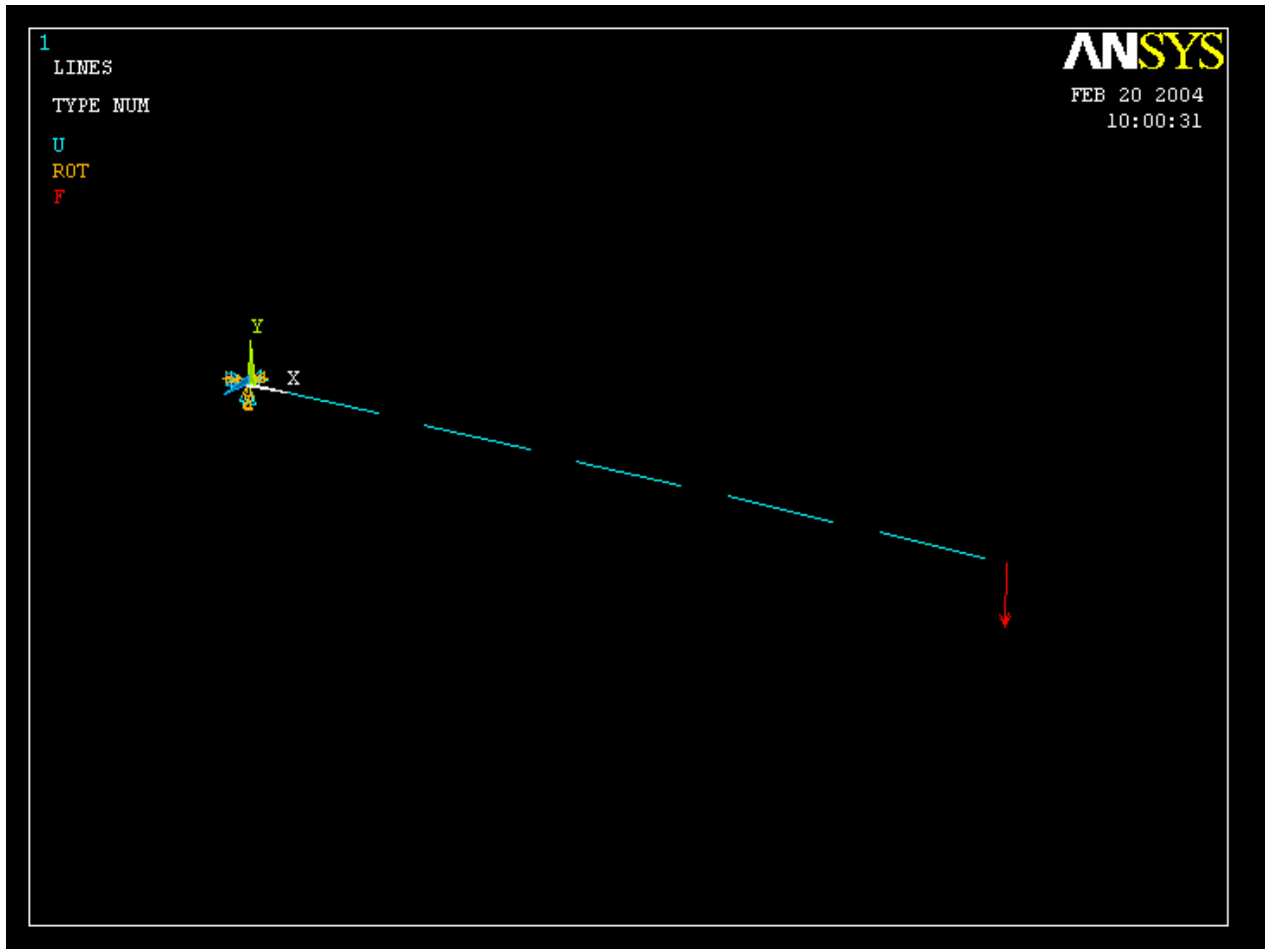
Press OK

Example - Convergence

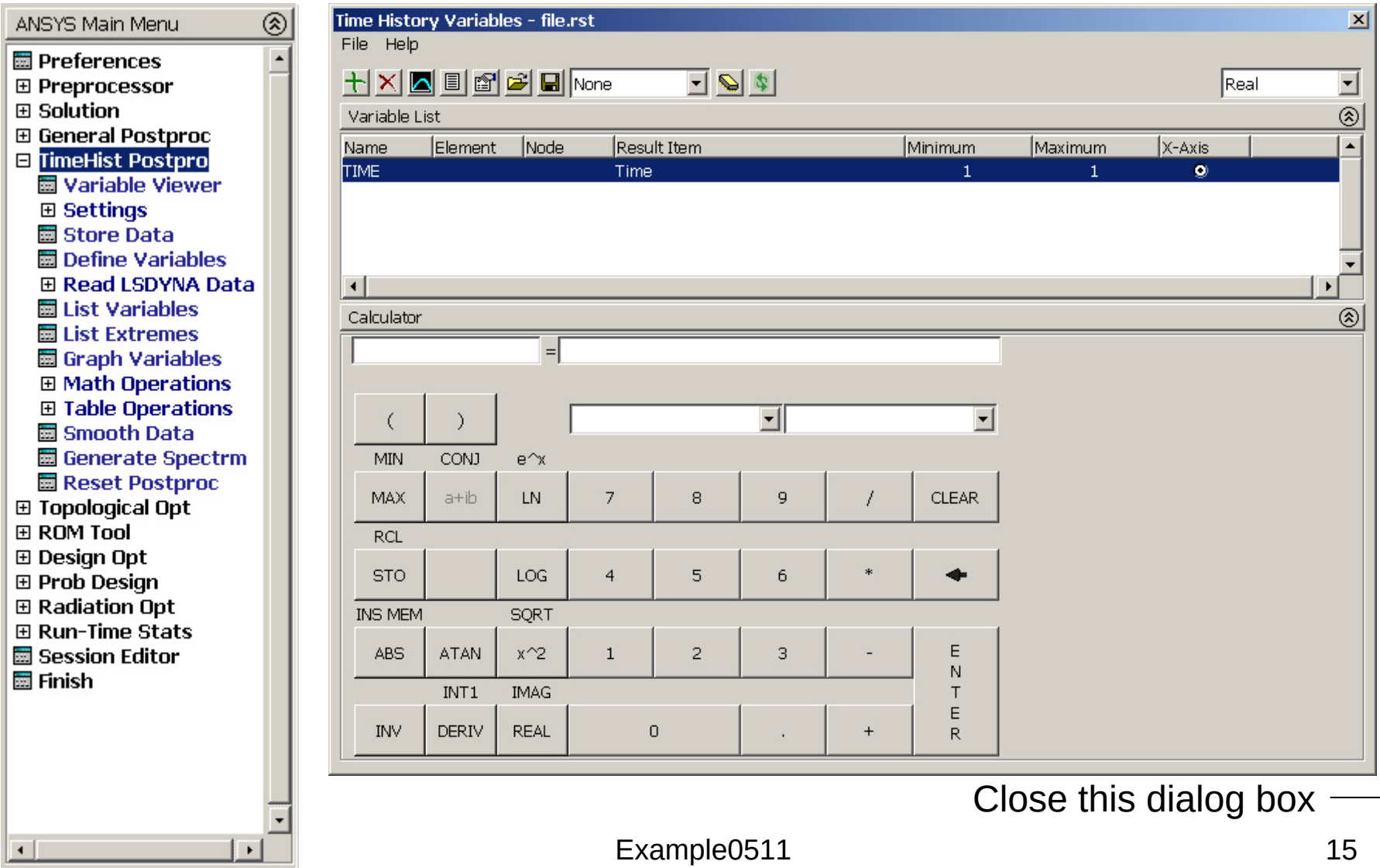


Example – Plot - Lines



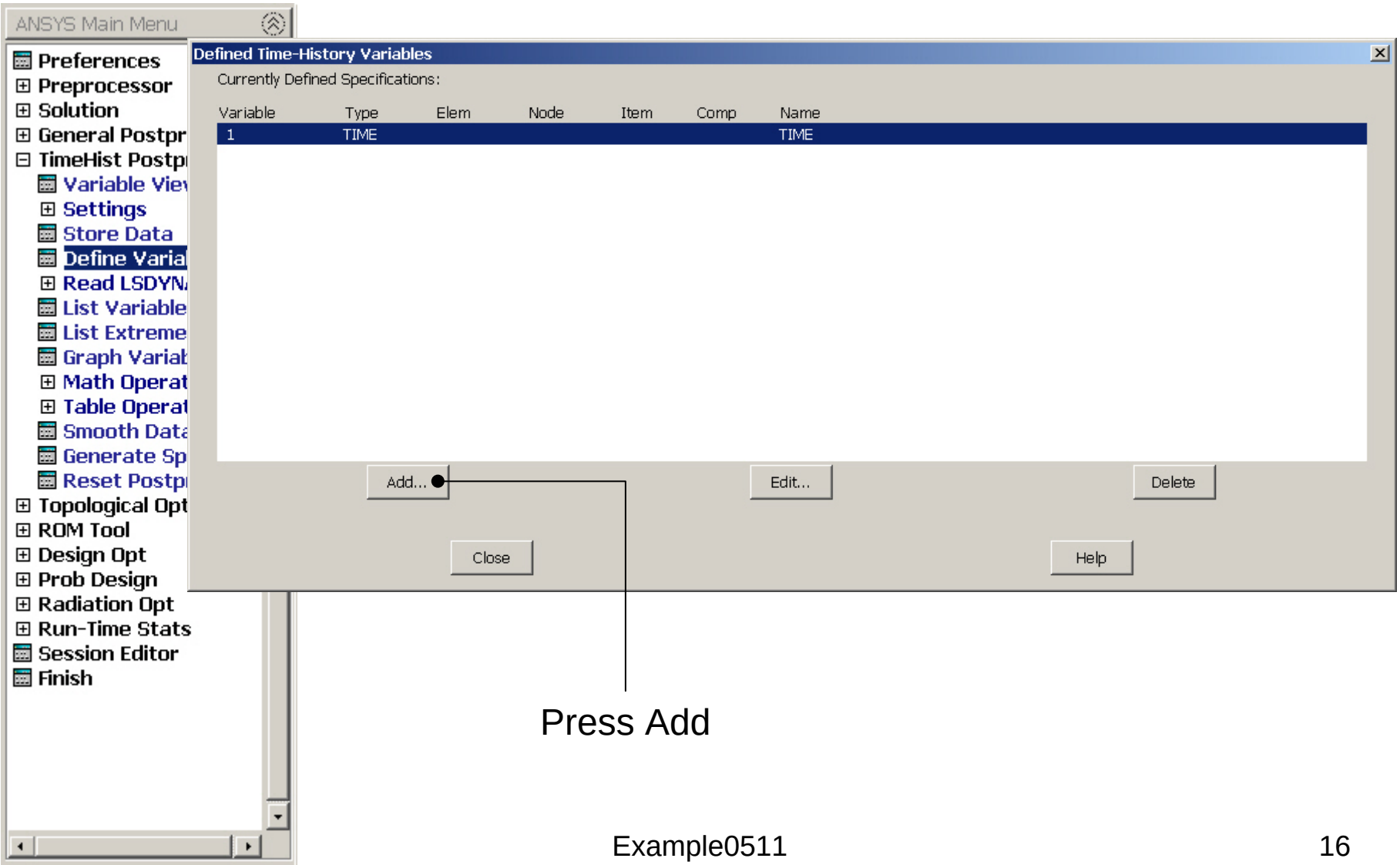


Example – TimeHistory Postpro



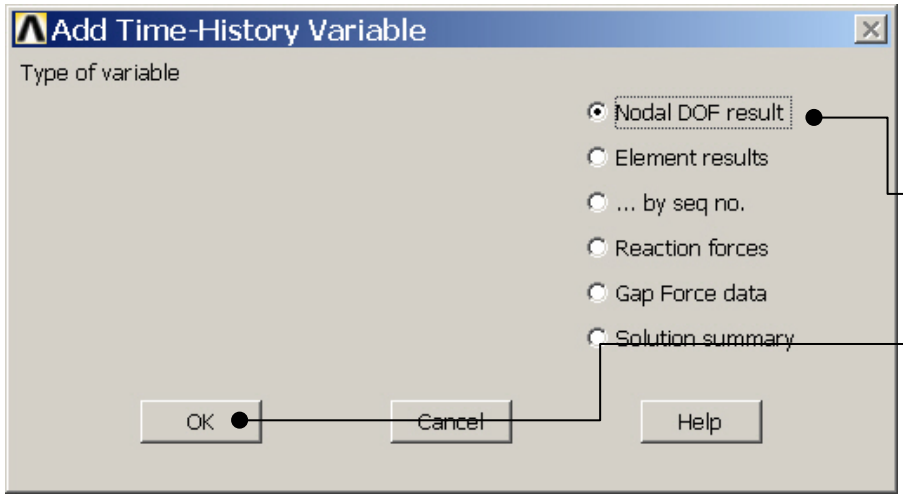
Close this dialog box

Example – Define Variables

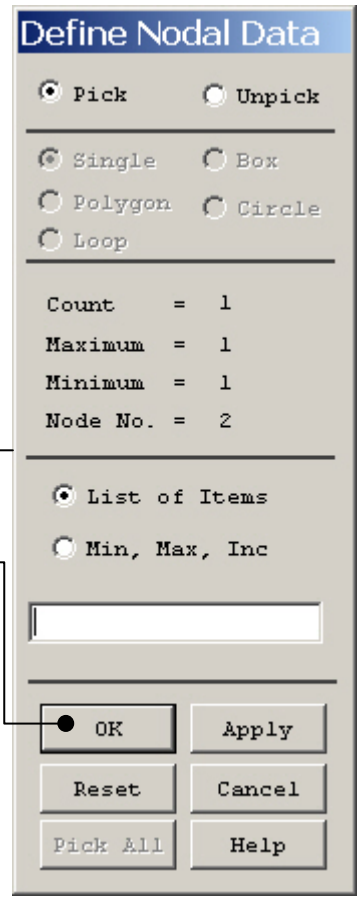


Press Add

Example – Add Time-History Var.

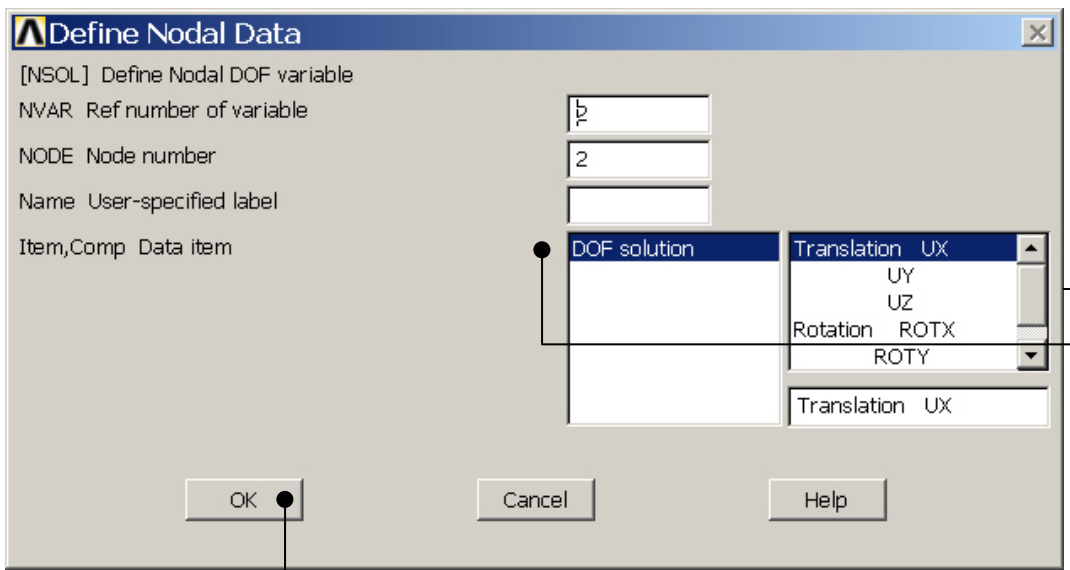


Pick the right node



Select Nodal DOF result

Press OK

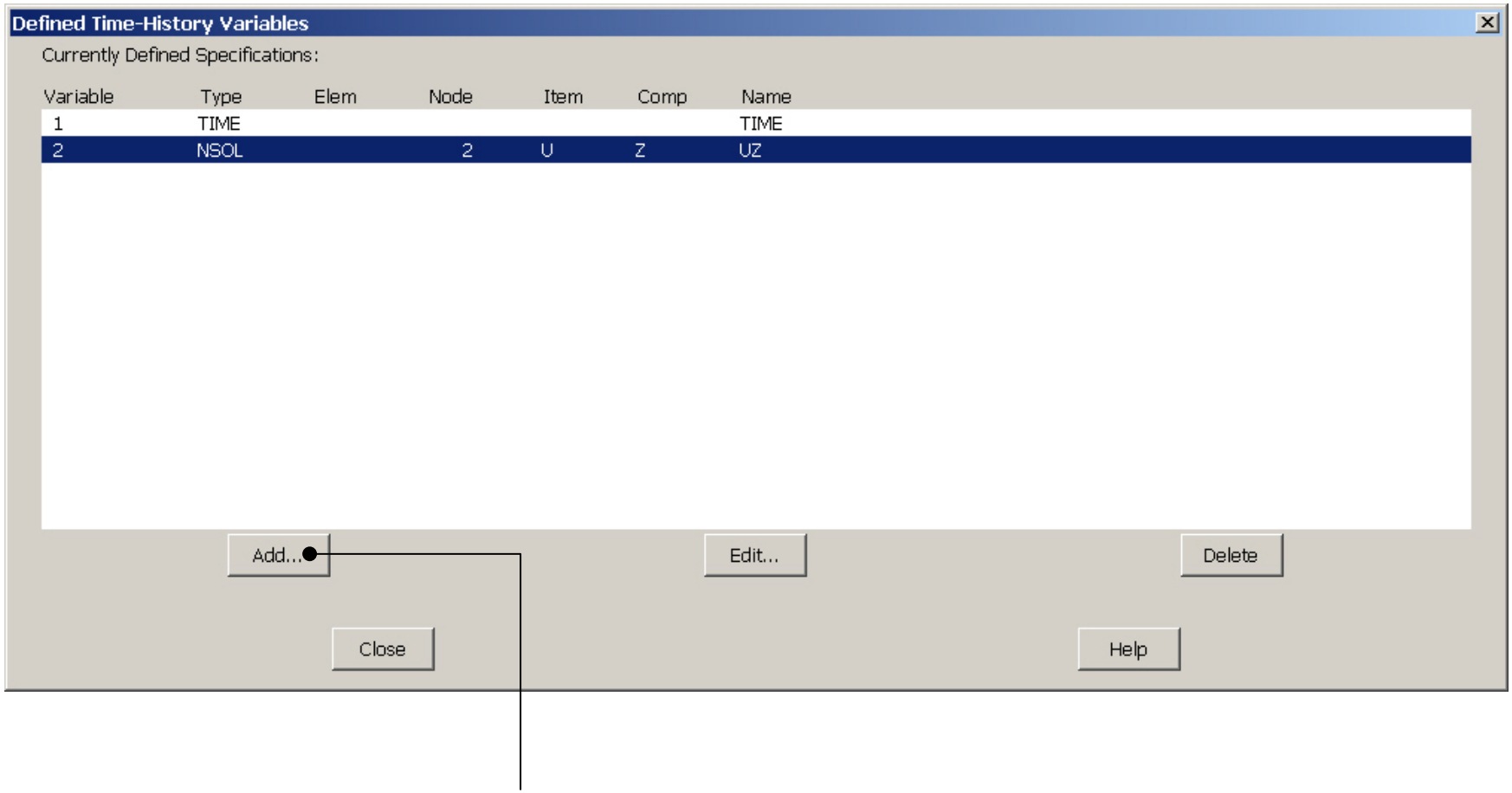


Press OK

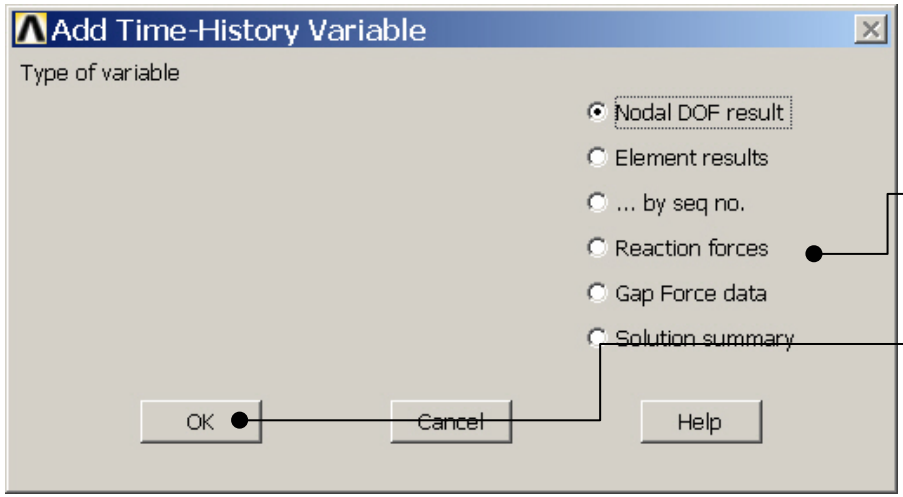
Select DOF solution and Translation UZ

Press OK

Example – Add Time-History Var.



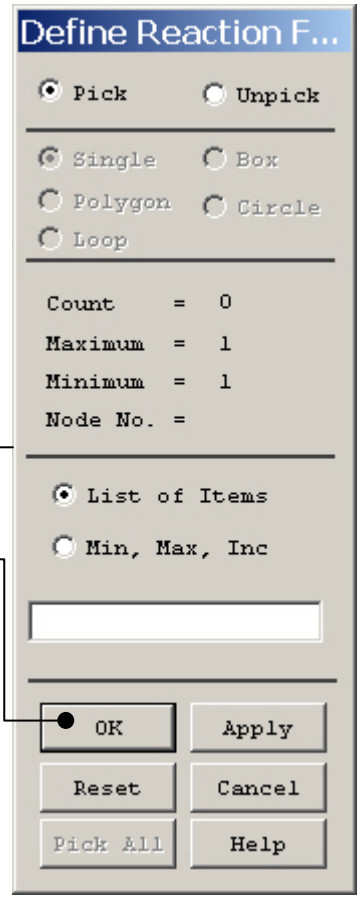
Example – Add Time-History Var.



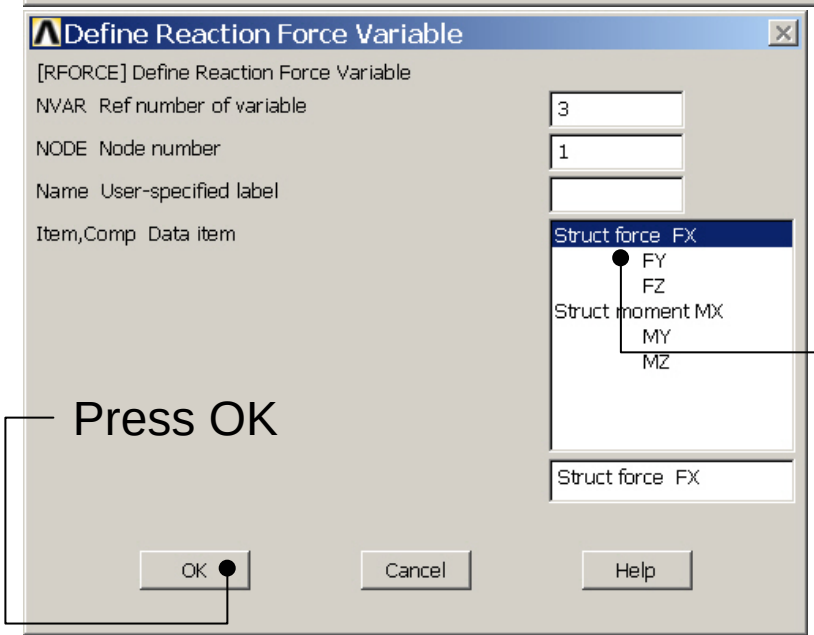
Pick the left node

Select Reaction forces

Press OK



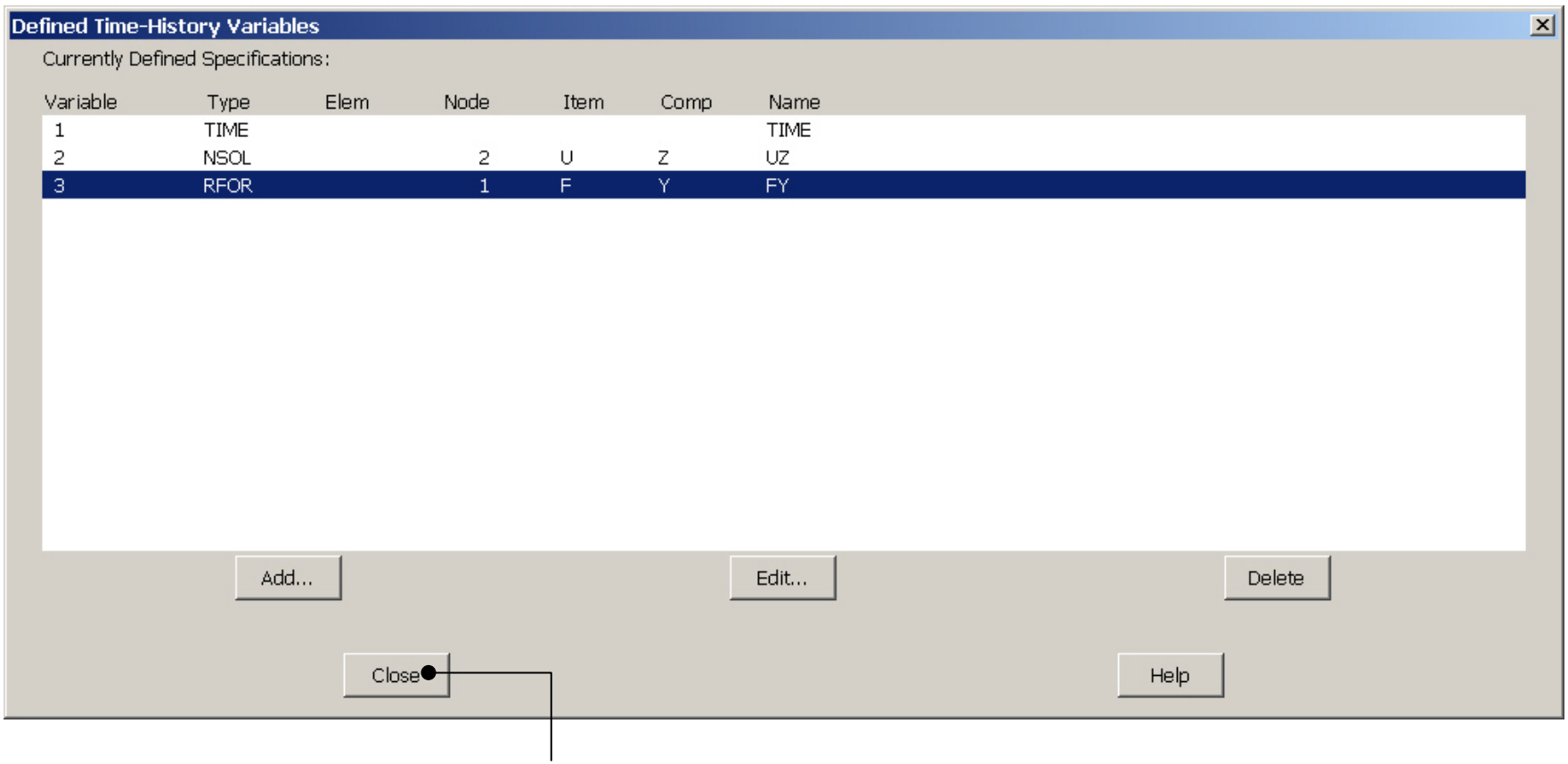
Press OK



Press OK

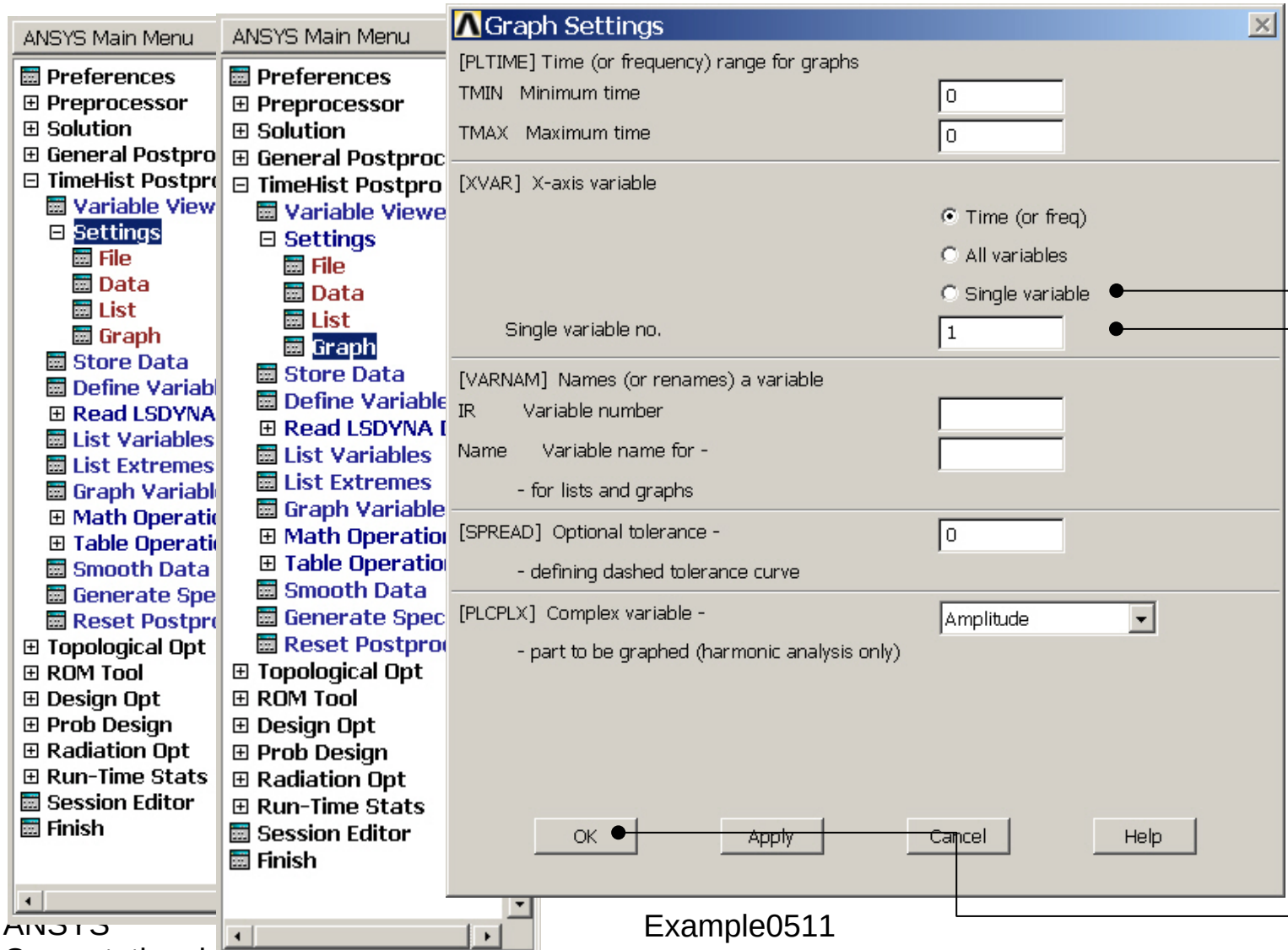
Select Struct force FY

Example – Add Time-History Var.



Press Close

Example - Settings

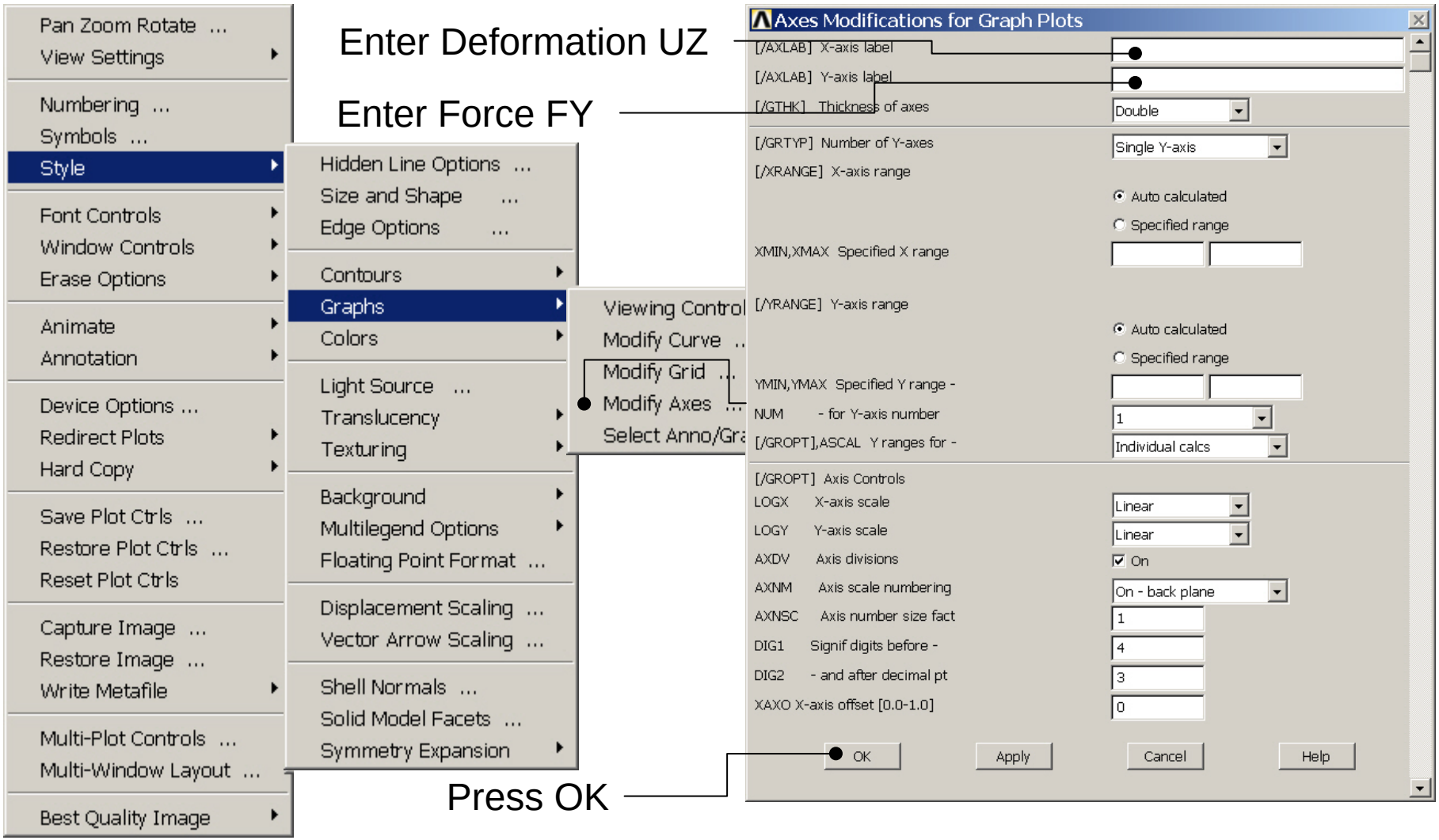


Select Single variable to plot on X-axis

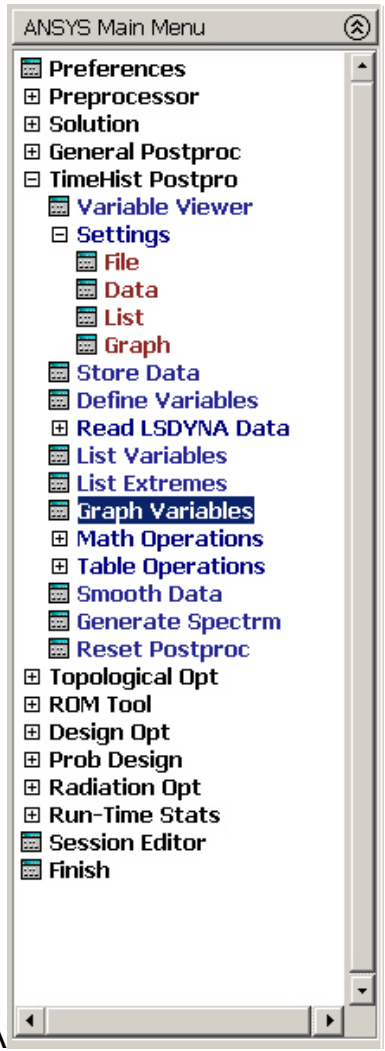
Enter 2 to plot UZ for the top node on the X-axis

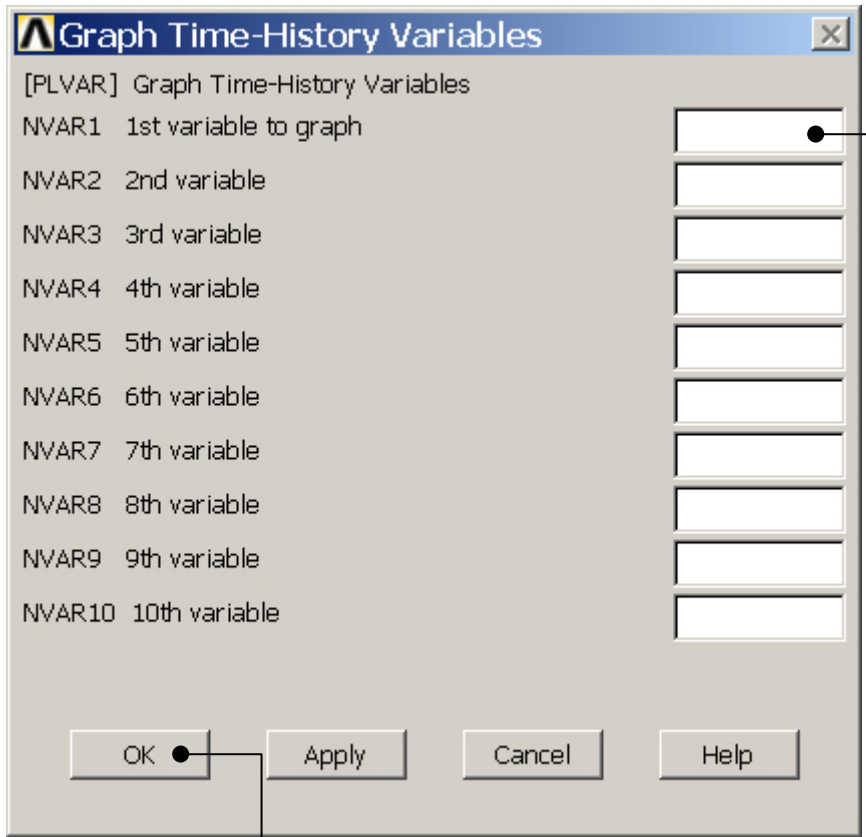
Press OK

Example – Style - Graph



Example – Graph Variables

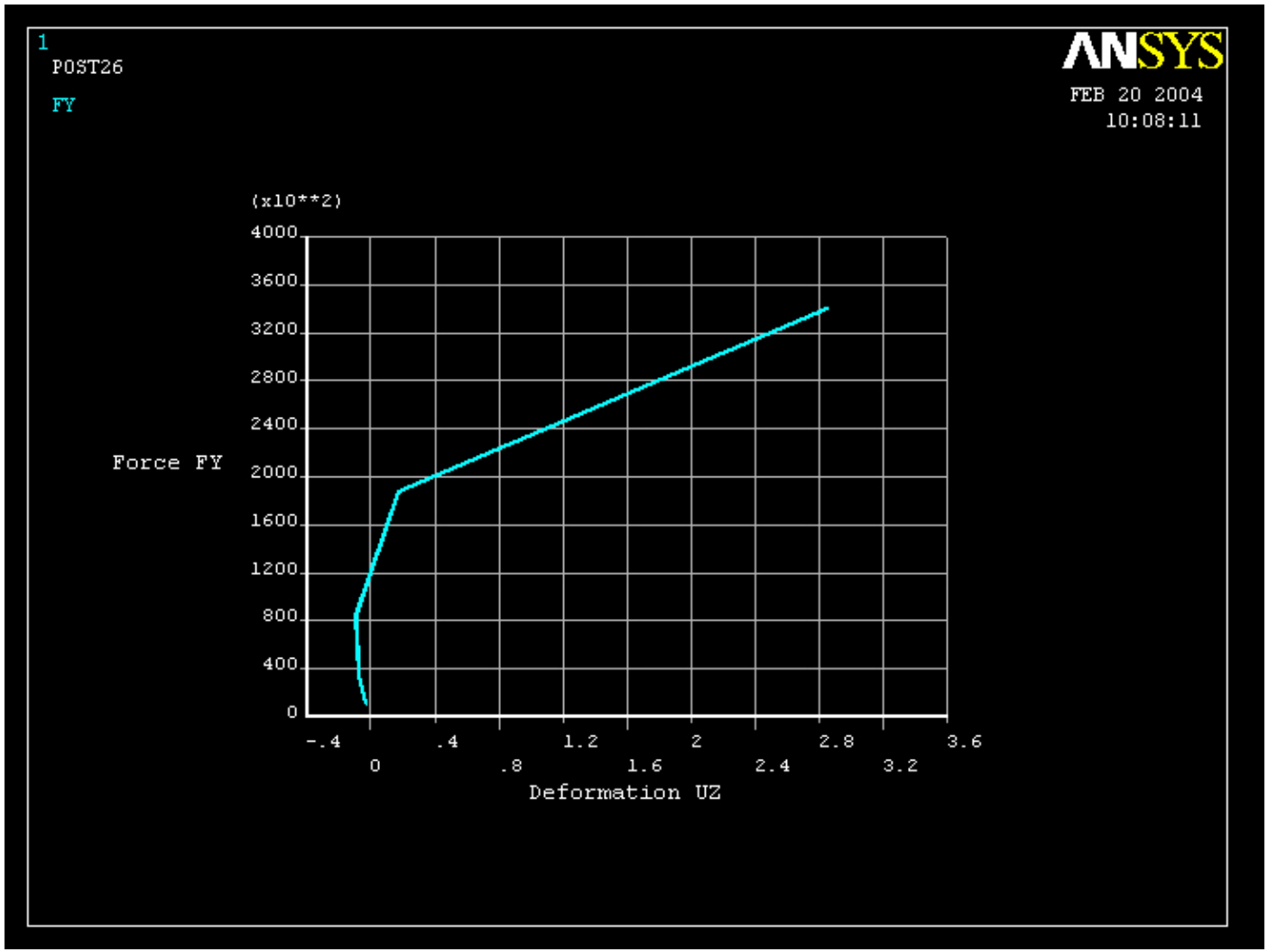




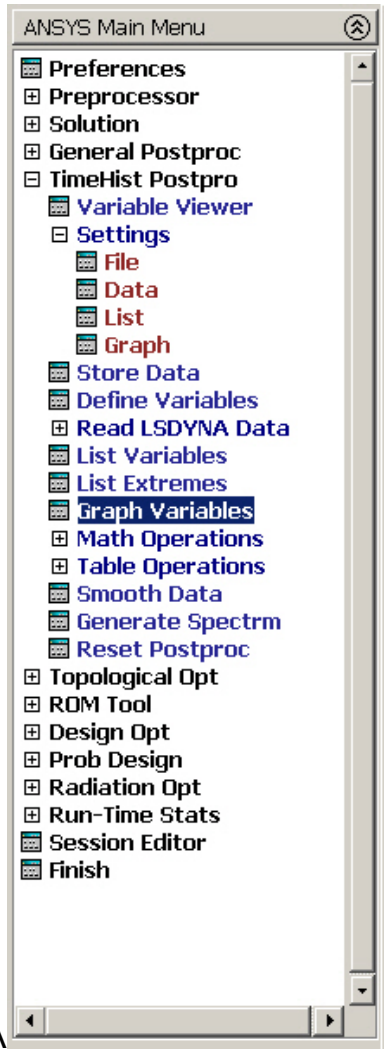
Enter 3 to plot the reaction force FY on the Y-axis

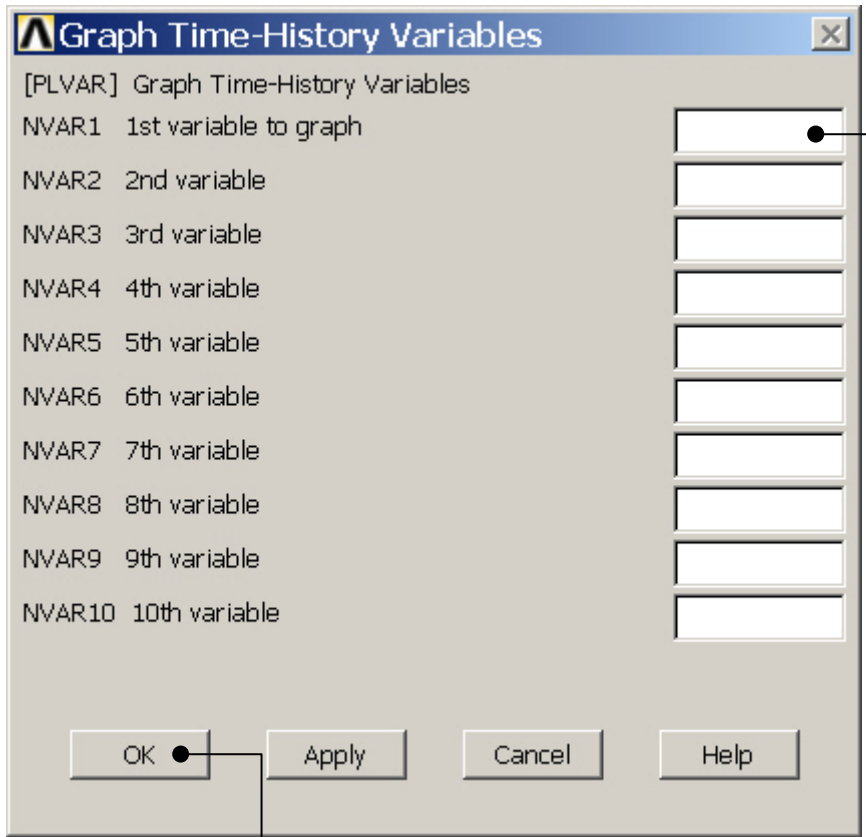
Press OK

Example - Graph



Example – Graph Variables





Enter 3 to plot the reaction force FY on the Y-axis

Press OK