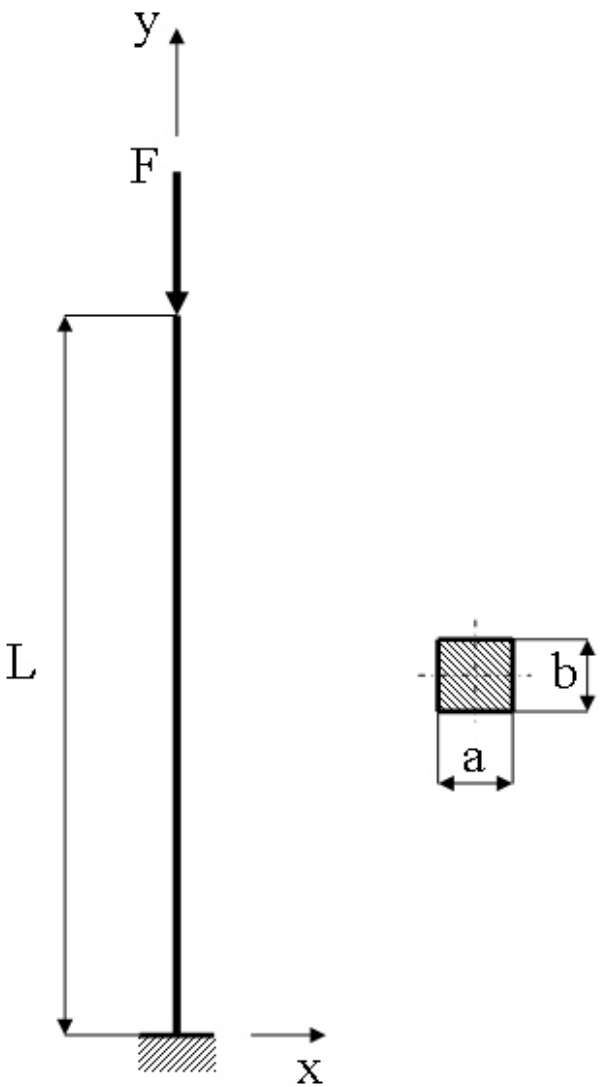
Course in ANSYS

Example0510

Example – Column 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

$E = 210000 N/mm^2$
$\nu = 0.3$
$L = 1000mm$
$a = 10mm$
$b = 10mm$
$F = 430N$

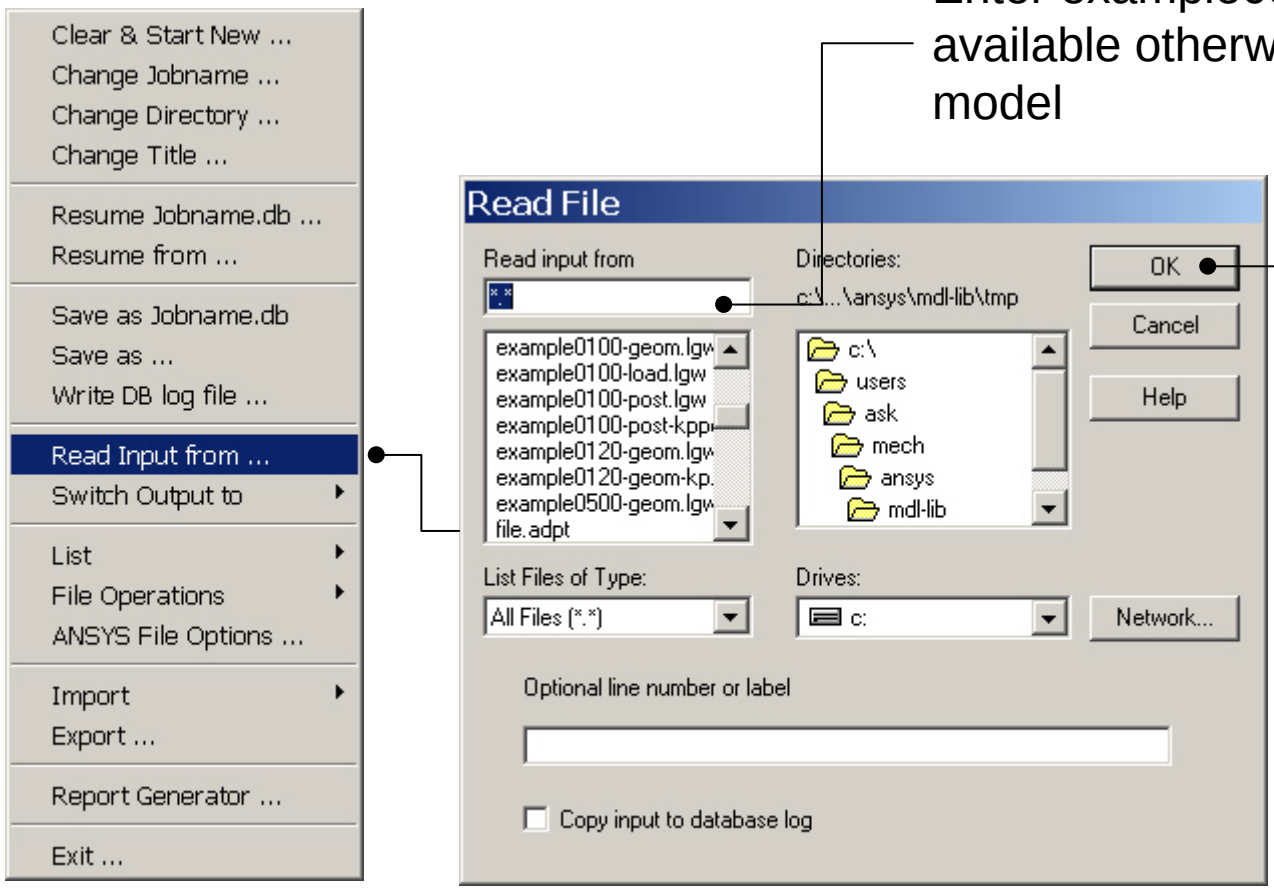
Nonlinear - Solution Phases

- 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

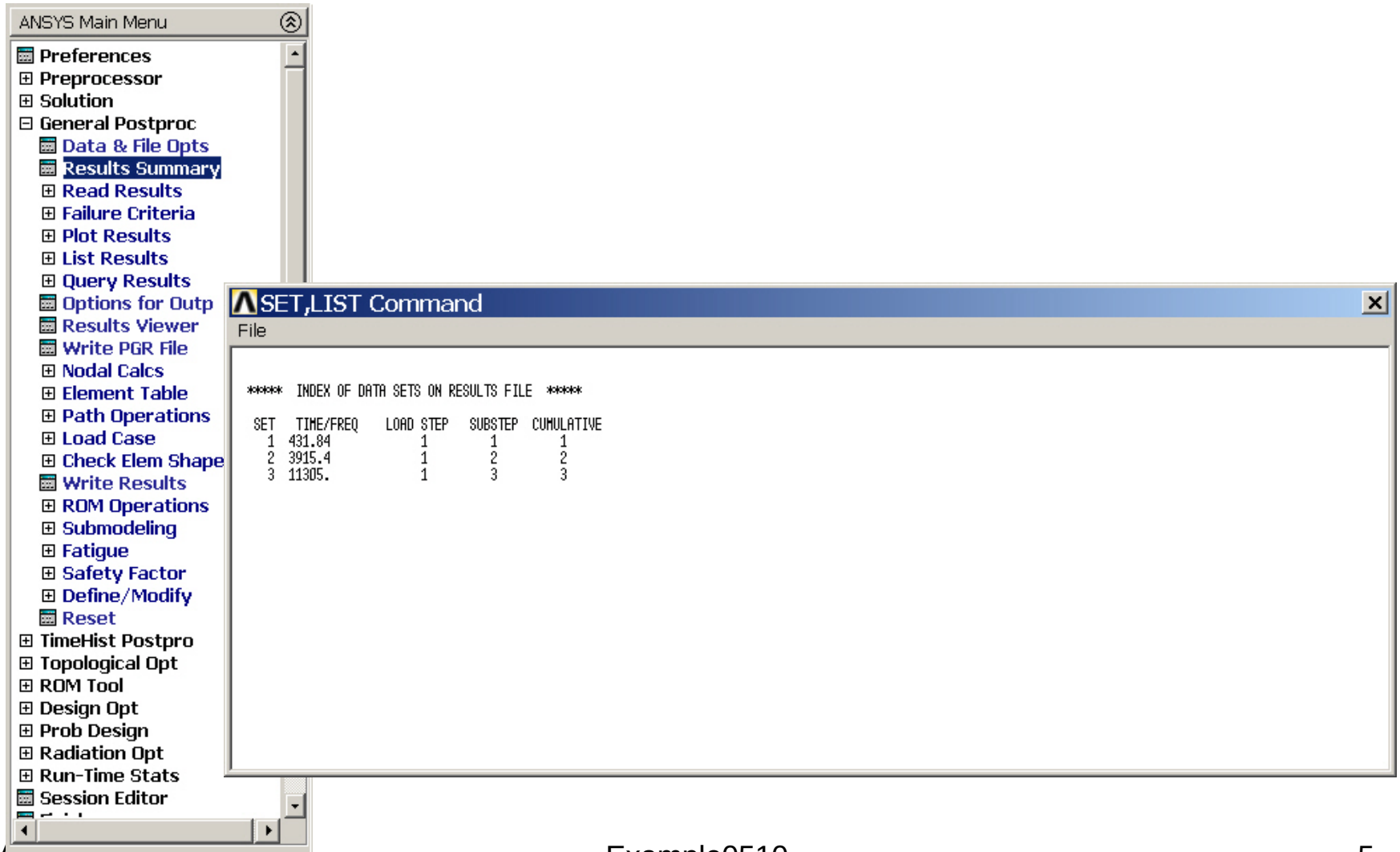
Example – Read Input from..

Enter example0500.lgw if available otherwise rebuild the model

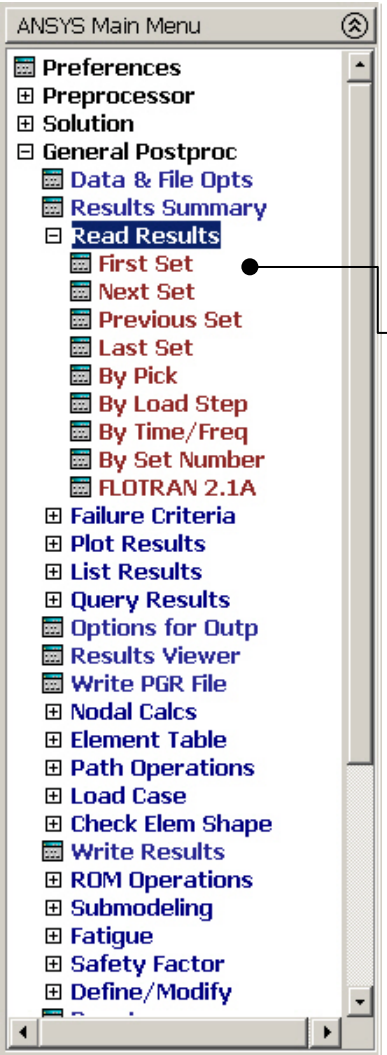


Press OK

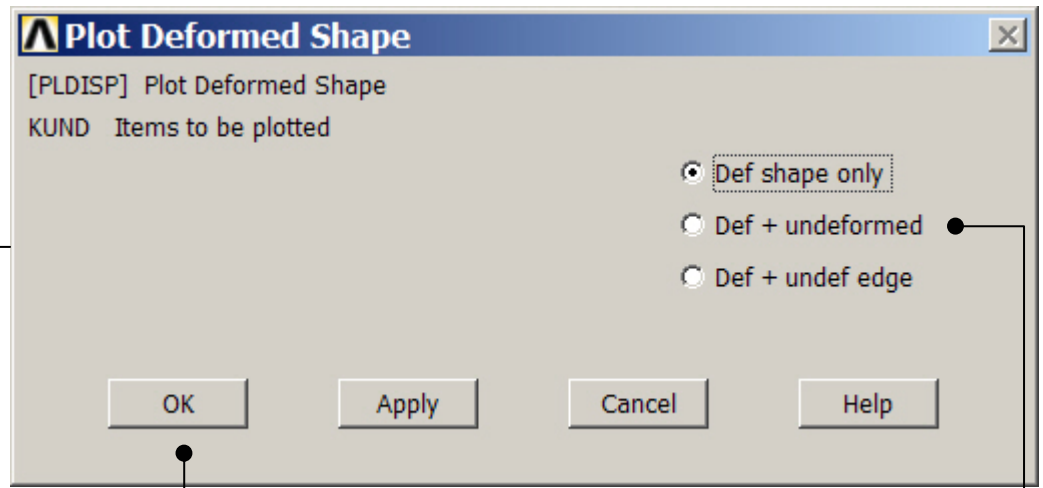
Example – Results Summary



Example – Read Results

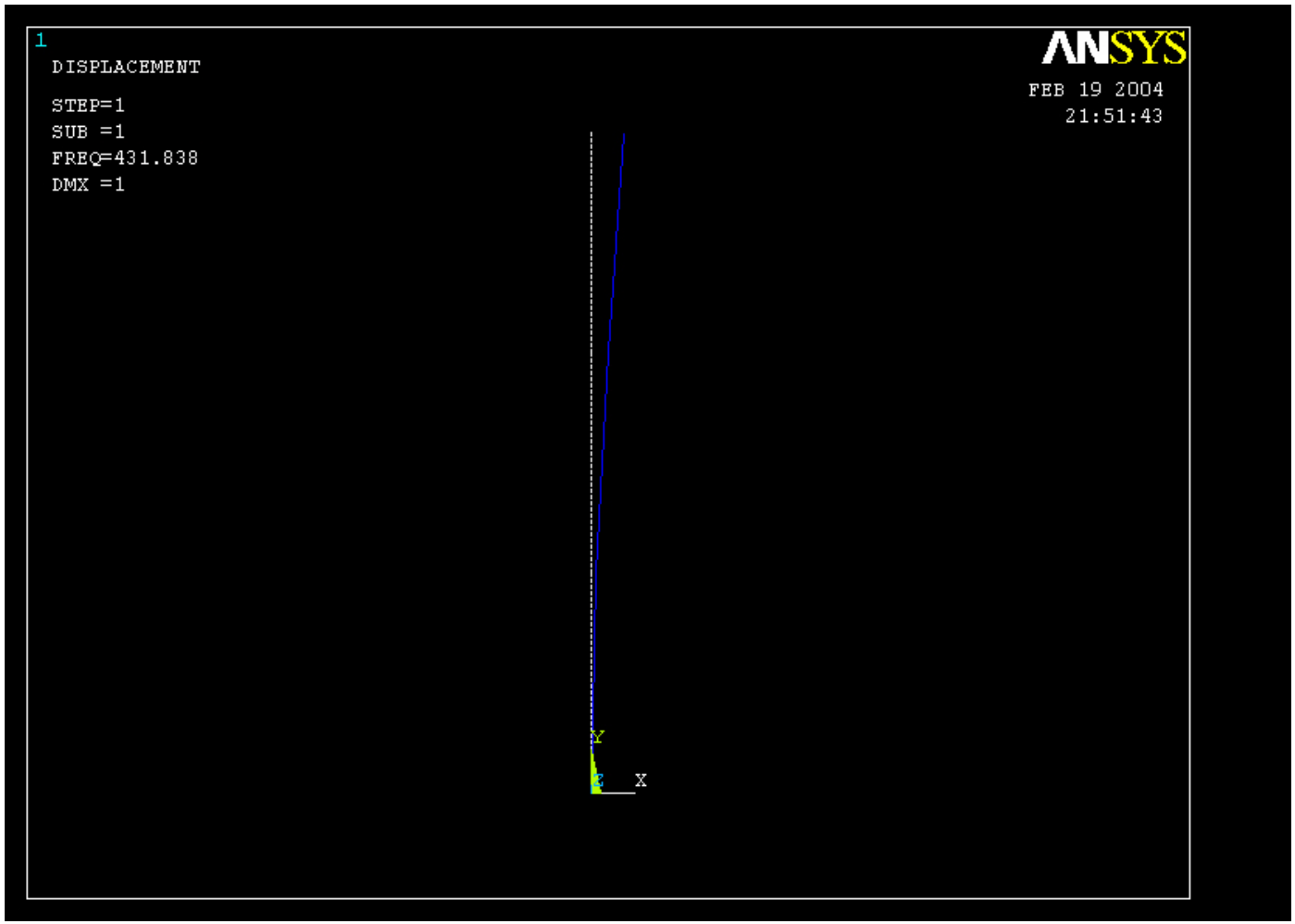


General Postproc > Plot Results > Deformed Shape

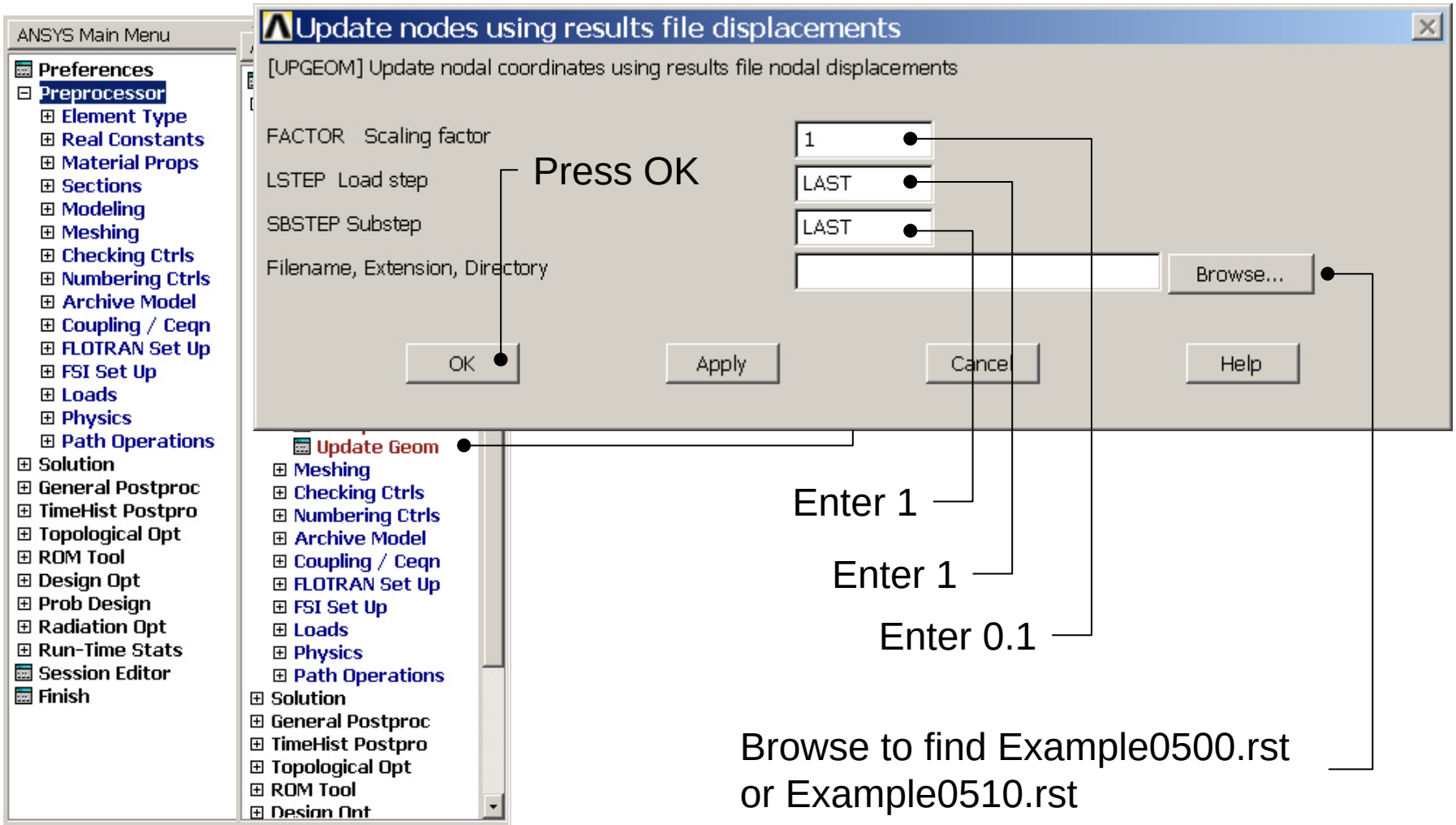


Select “Def+undeformed” and Press OK

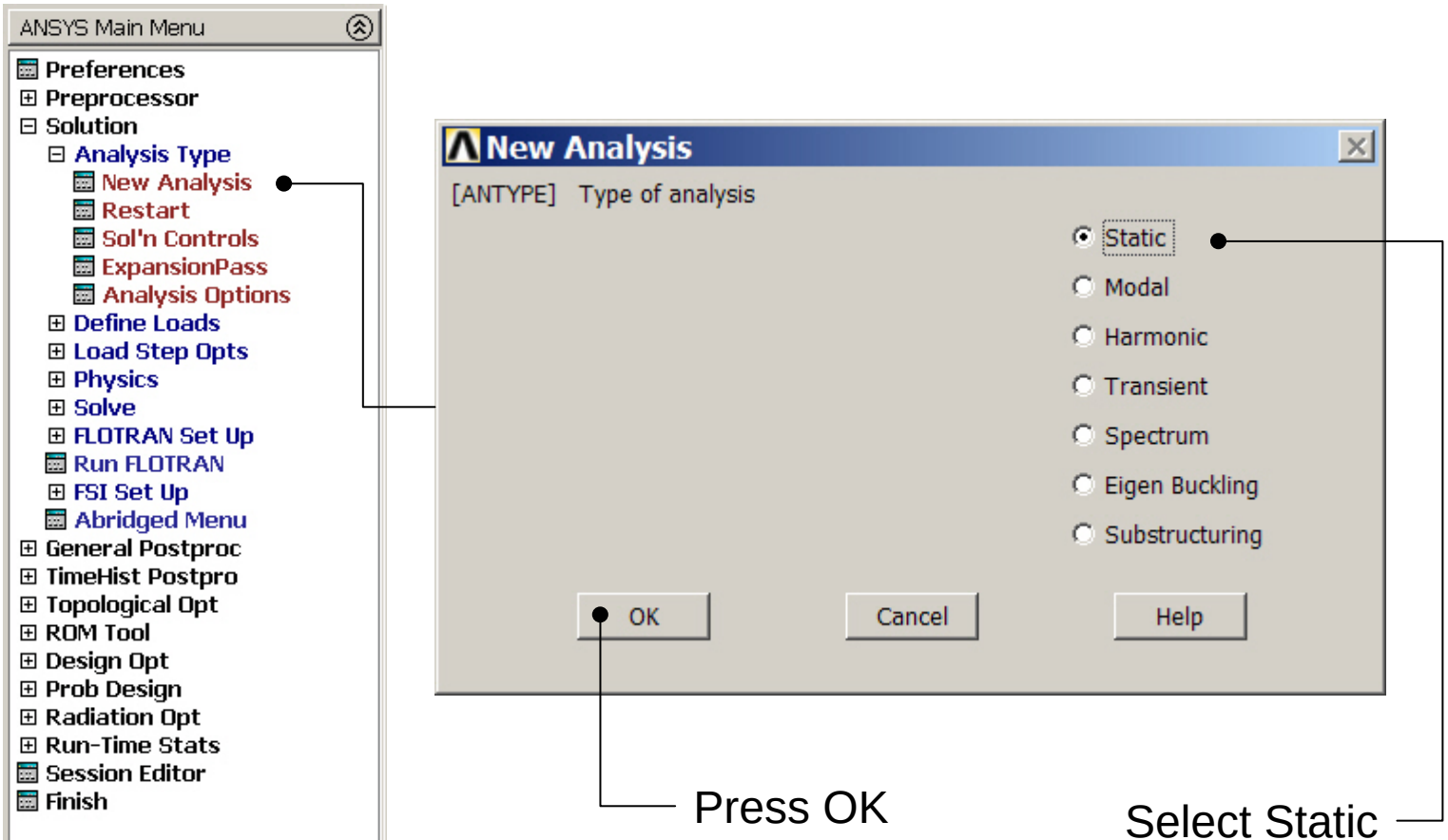
Example – Buckling mode



Example - Update Geom

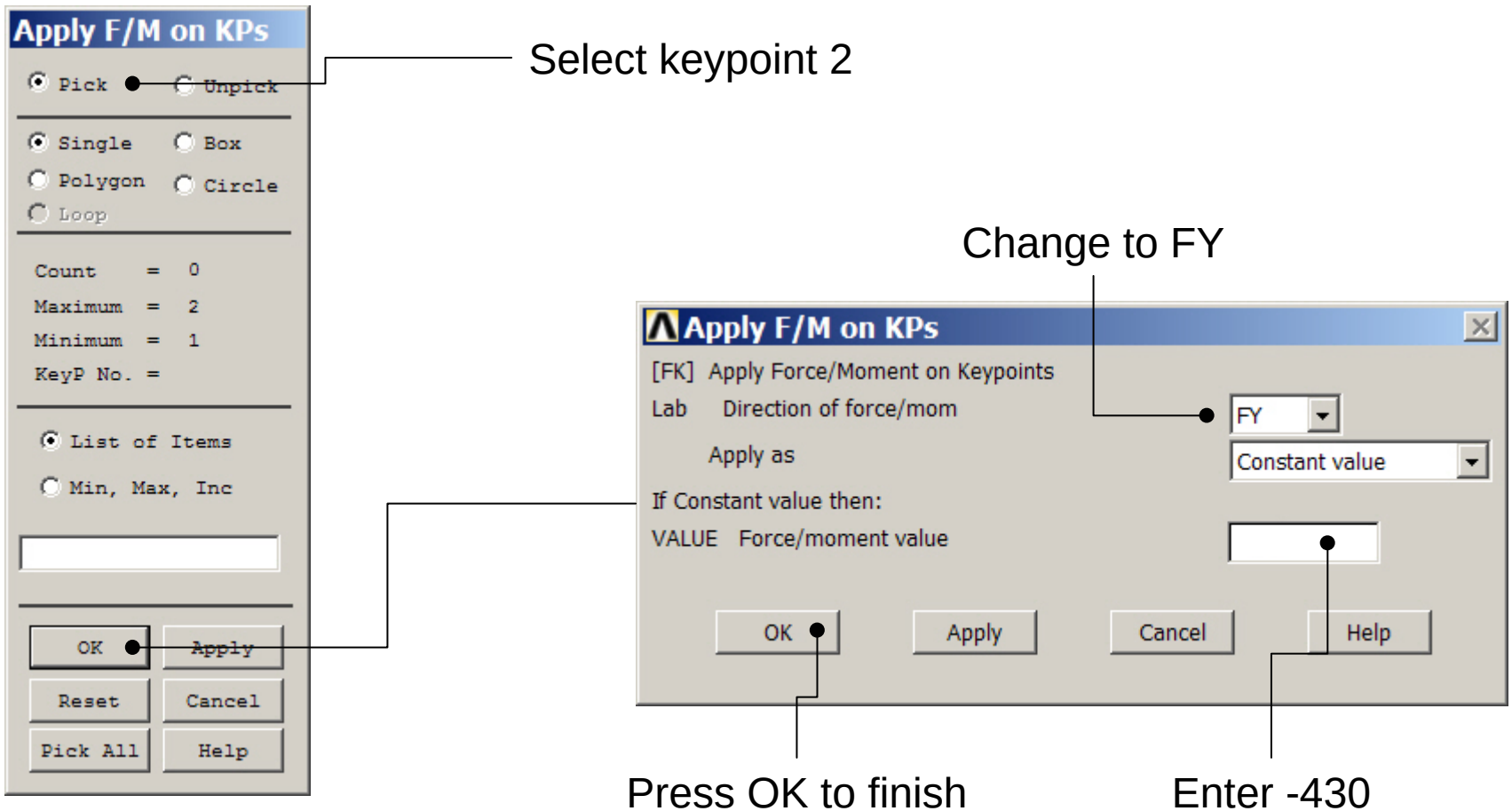


Example – Analysis Type

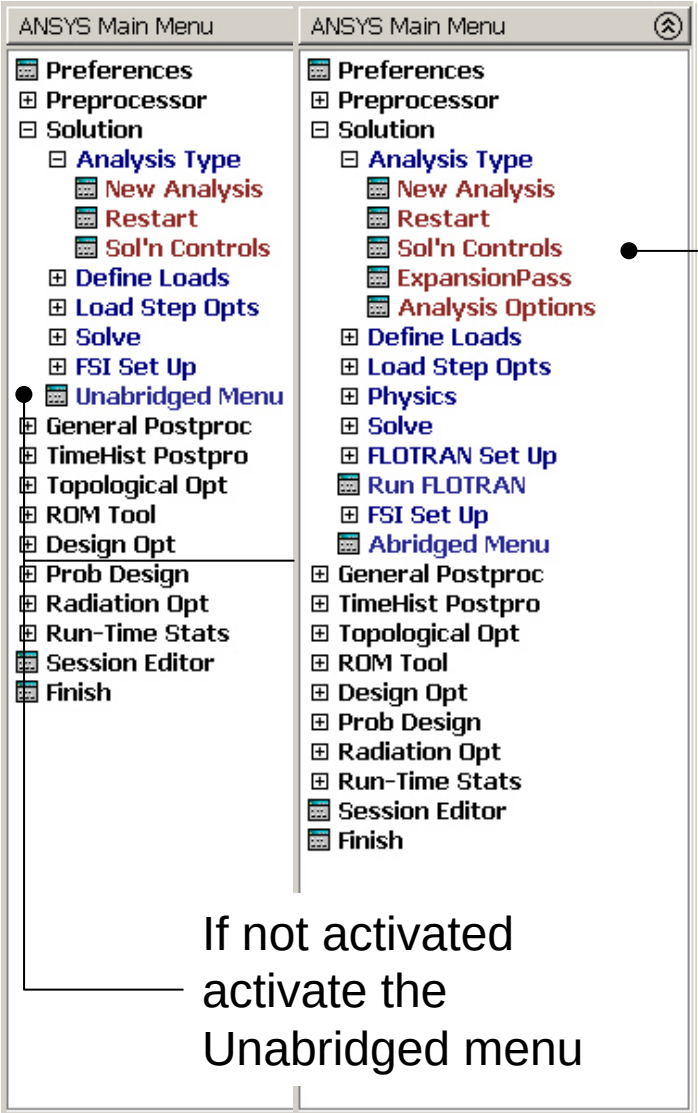


Example – Define Loads

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



Static solution – Analysis Options

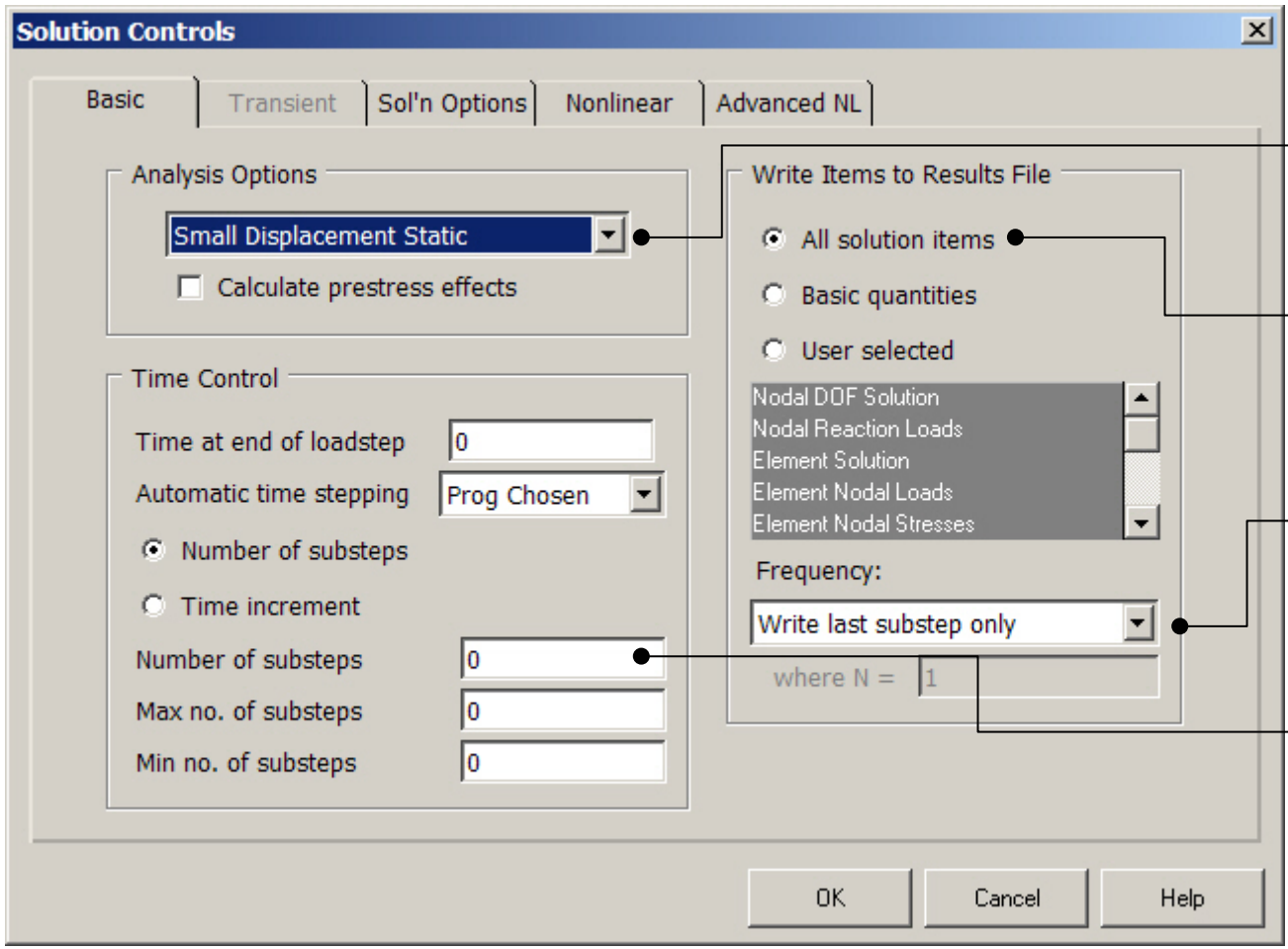


Select Sol'n Controls

If not activated activate the Unabridged menu

Example0510

Example – Solution Controls



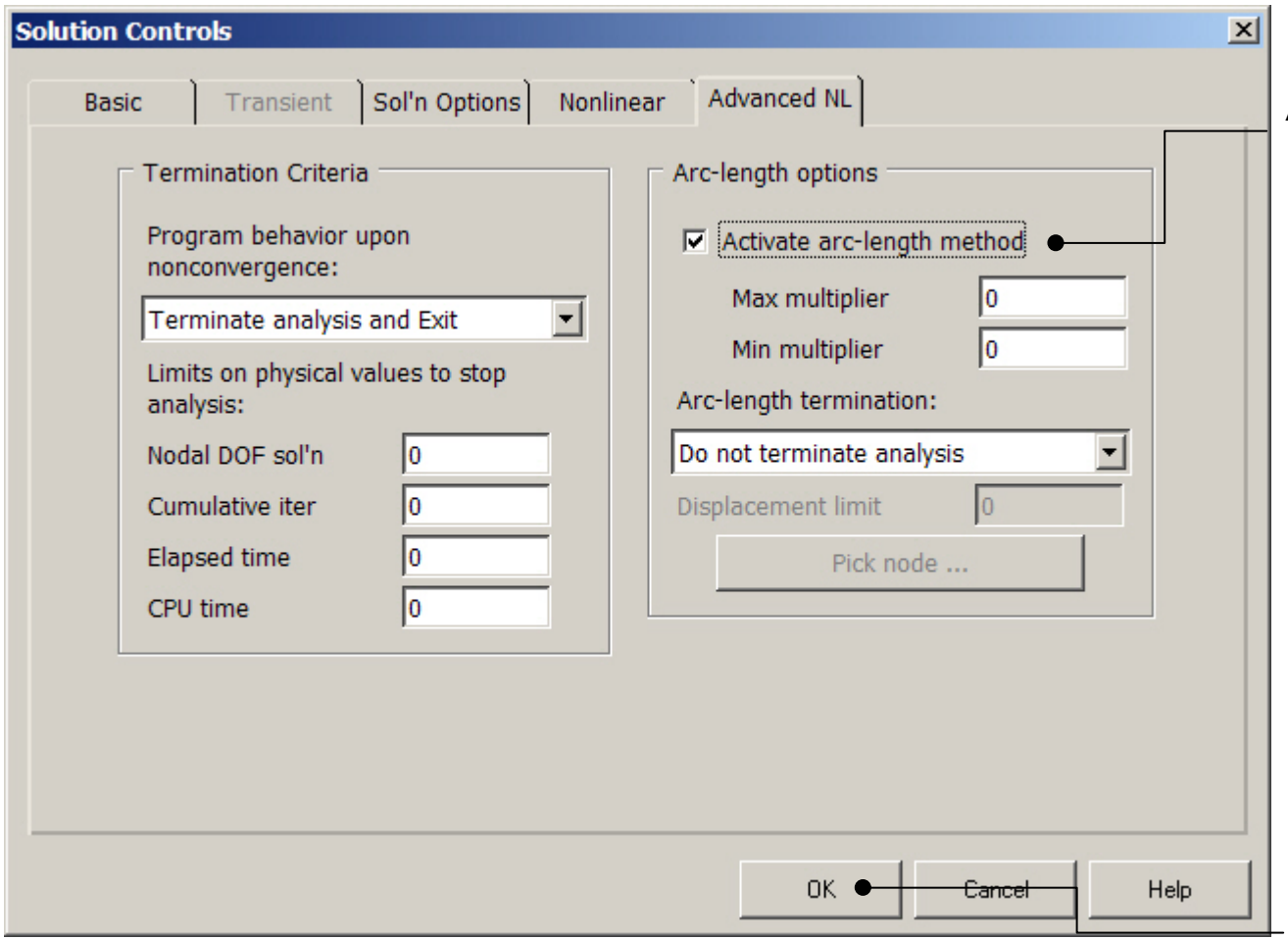
Change to Large Displacement Static

Select All solution items

Select Write every Nth substeps

Enter 30

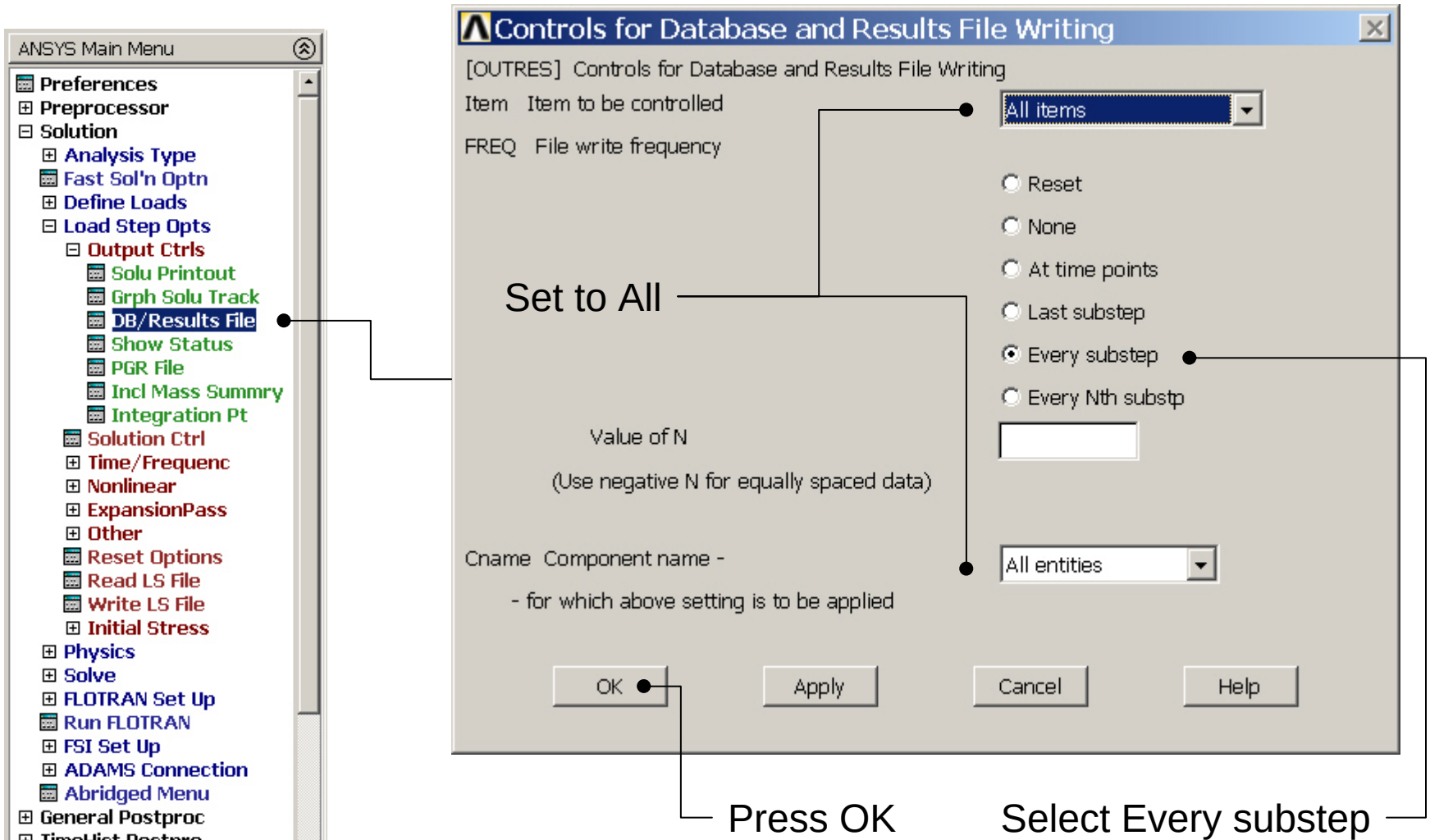
Example – Solution Controls



Activate the arc-length method

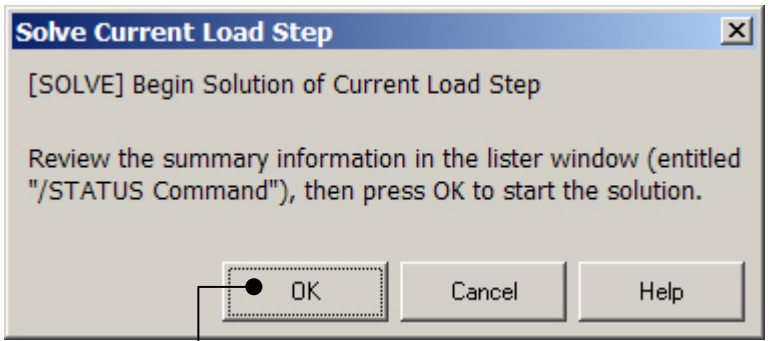
Press OK

Example – Output Ctrls



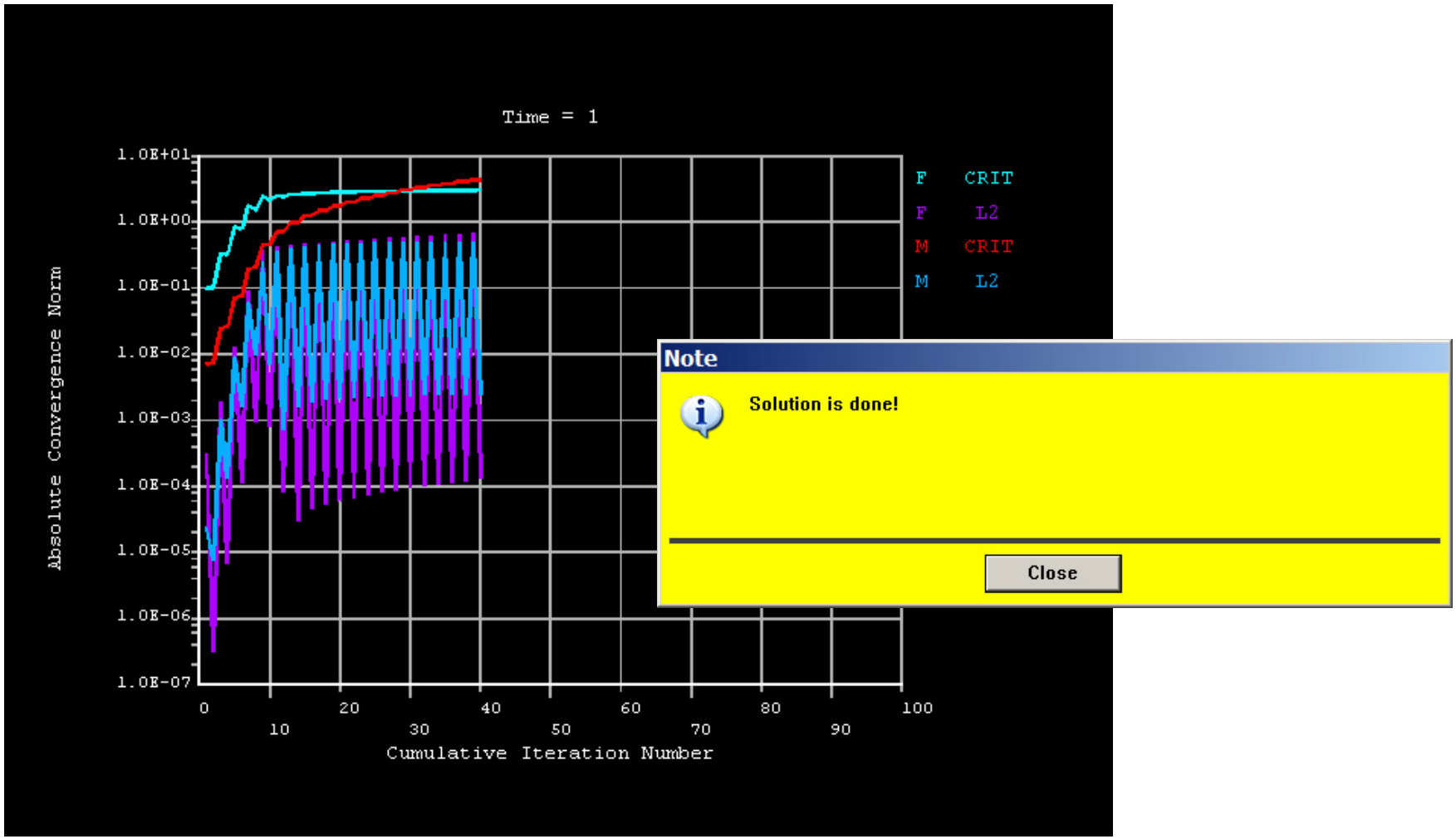
Example - Solve

Solution > Solve > Current LS

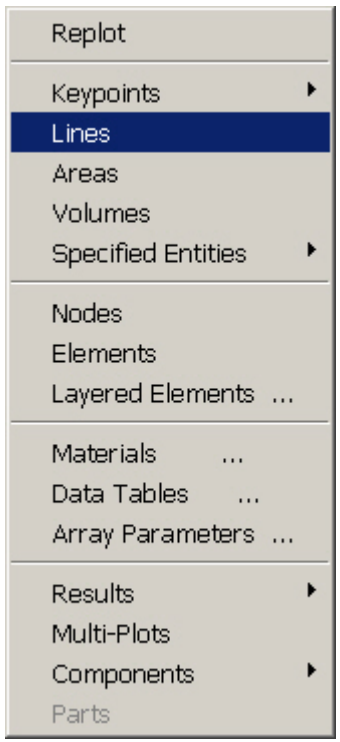


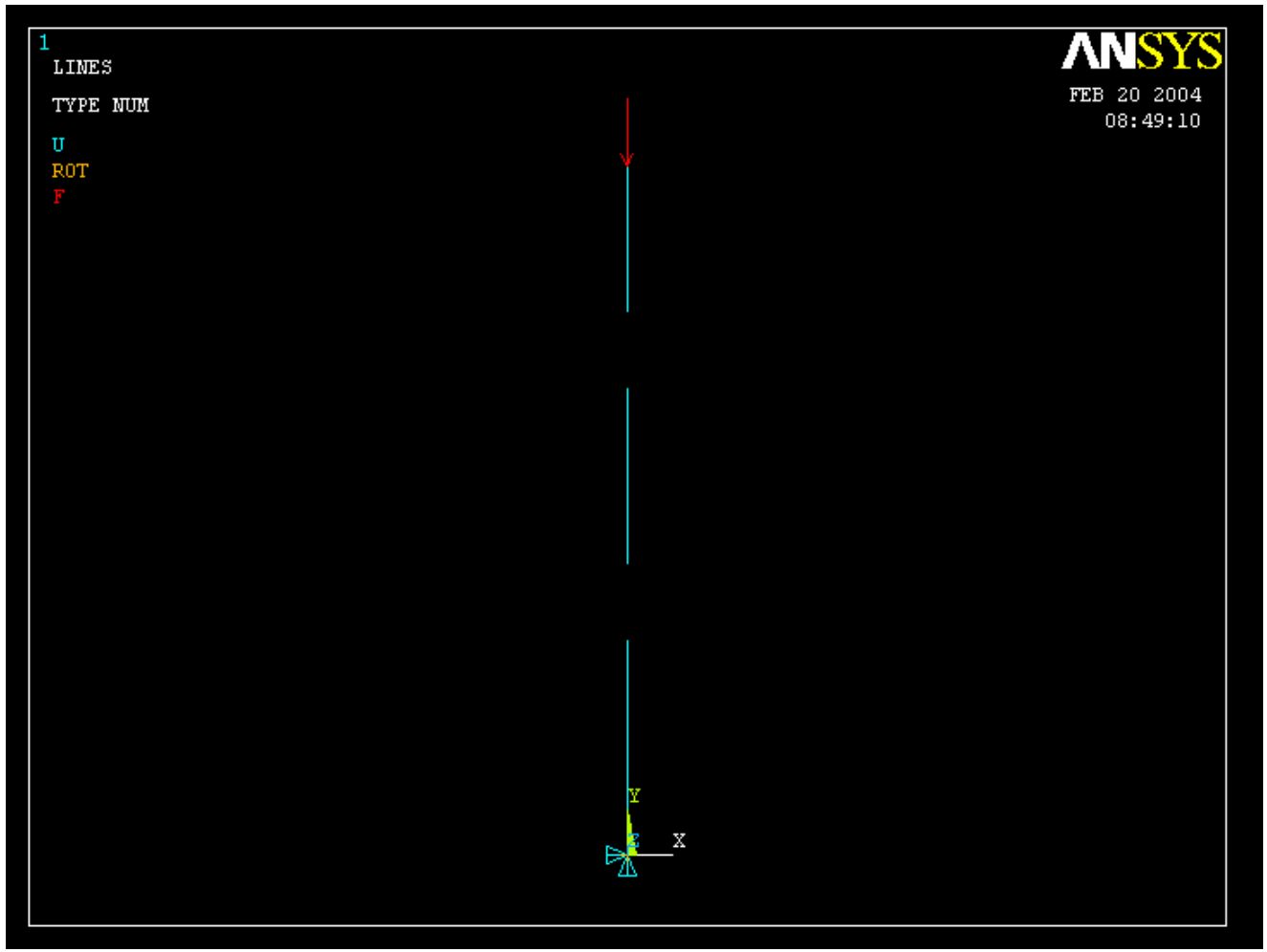
Press OK

Example - Convergence

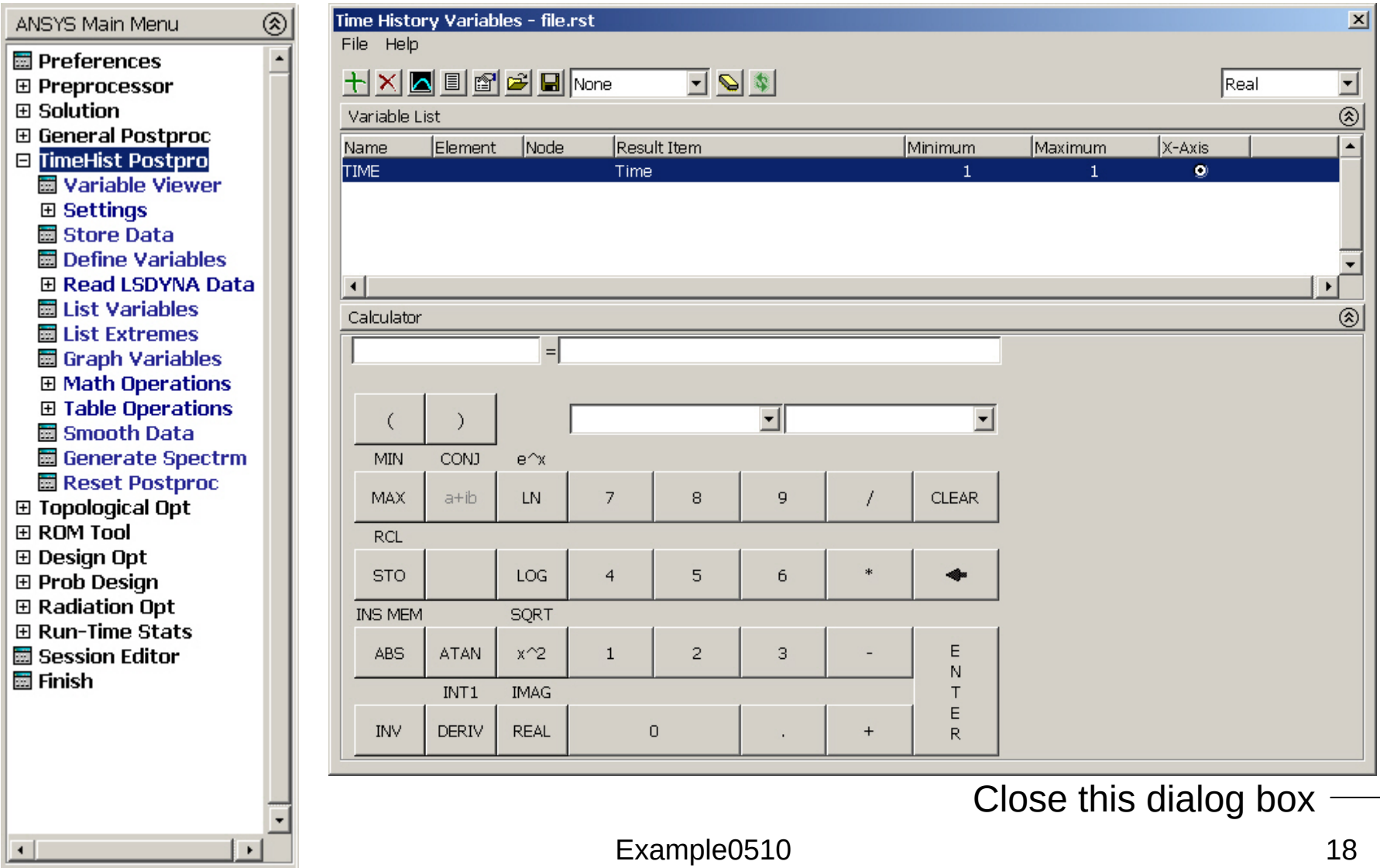


Example – Plot - Lines



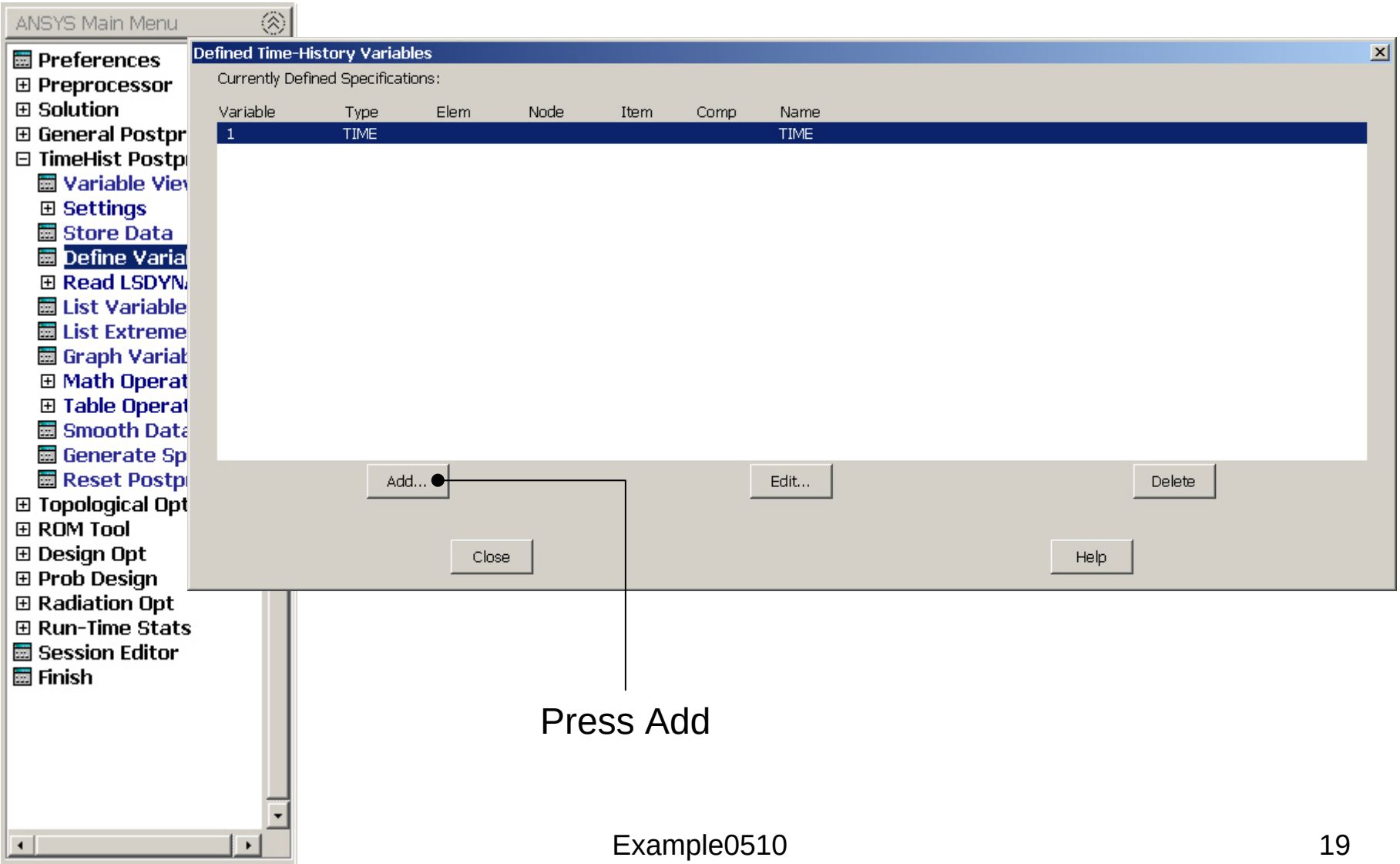


Example – TimeHistory Postpro



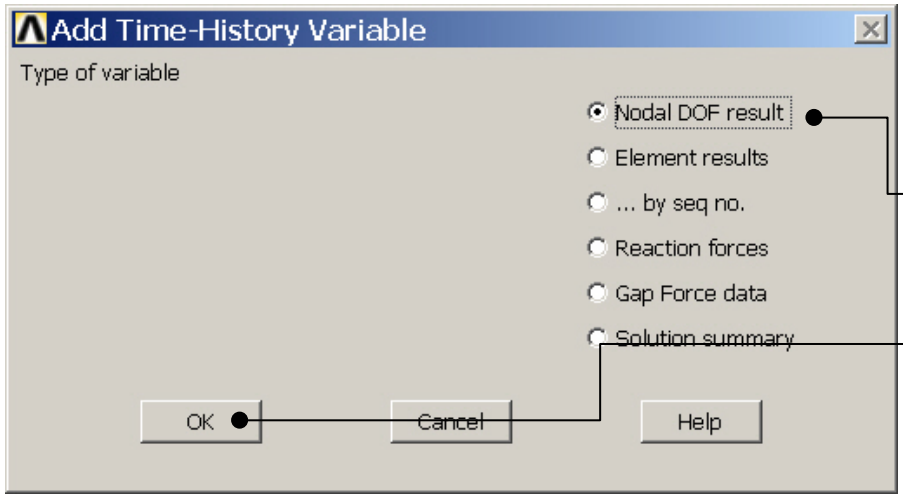
Close this dialog box

Example – Define Variables



Press Add

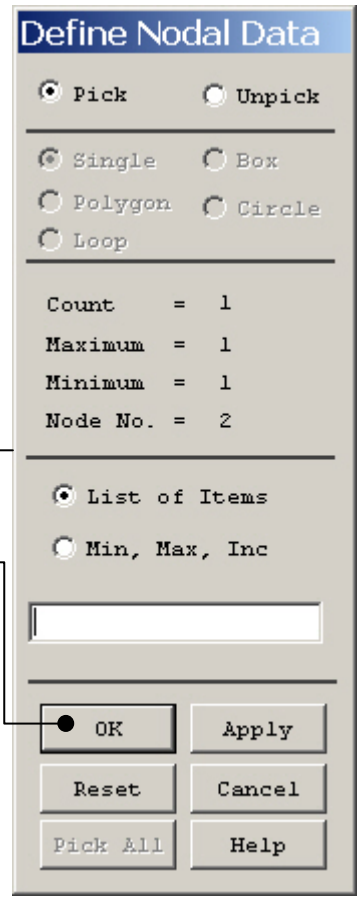
Example – Add Time-History Var.

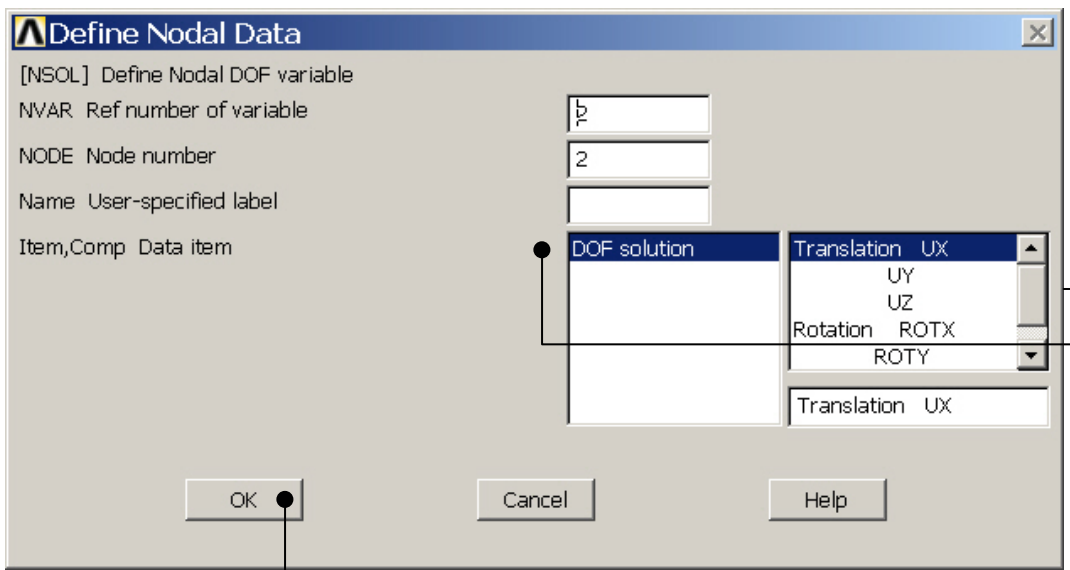


Pick the top node

Select Nodal DOF result

Press OK



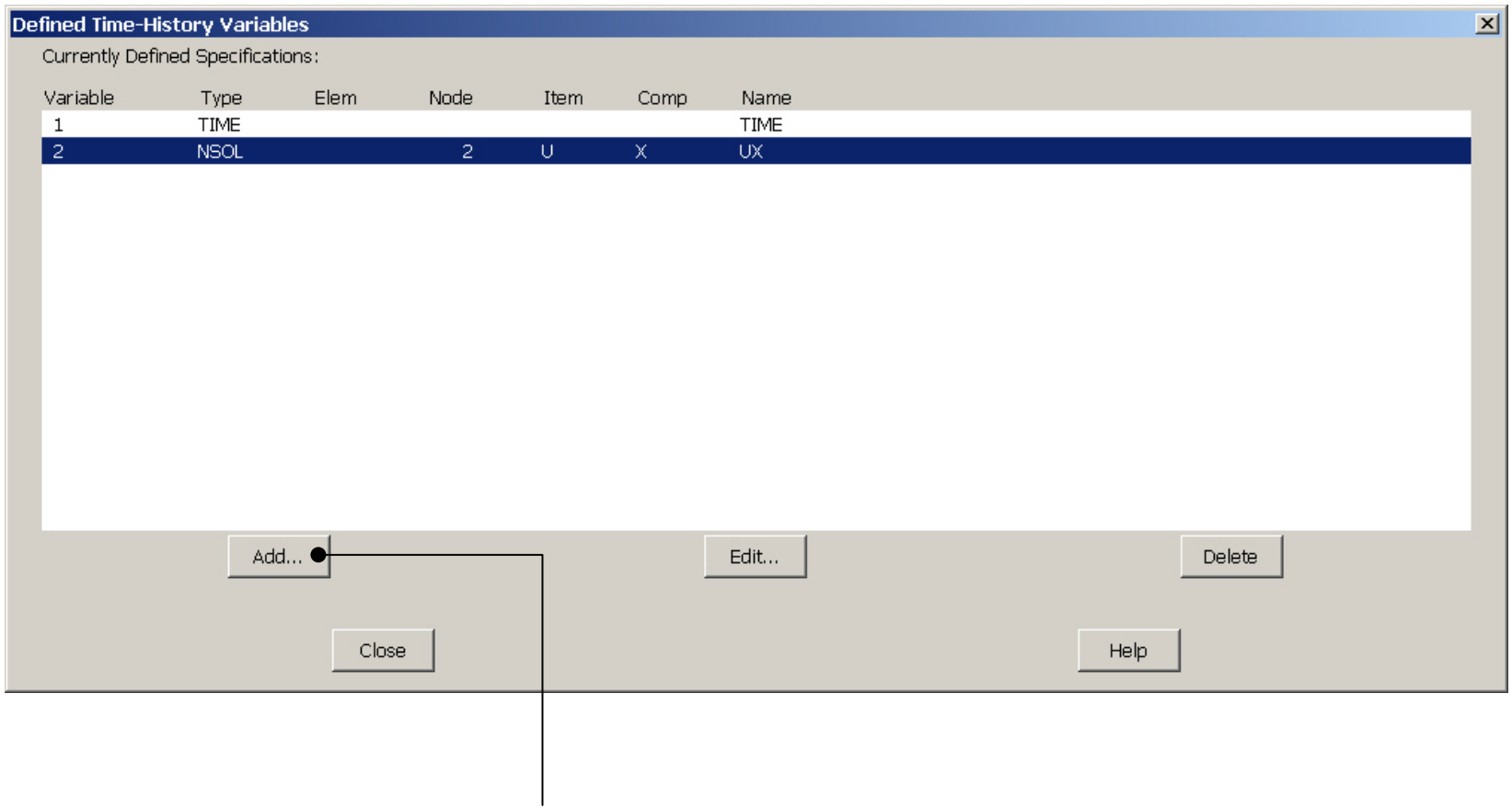


Press OK

Select DOF solution and Translation UX

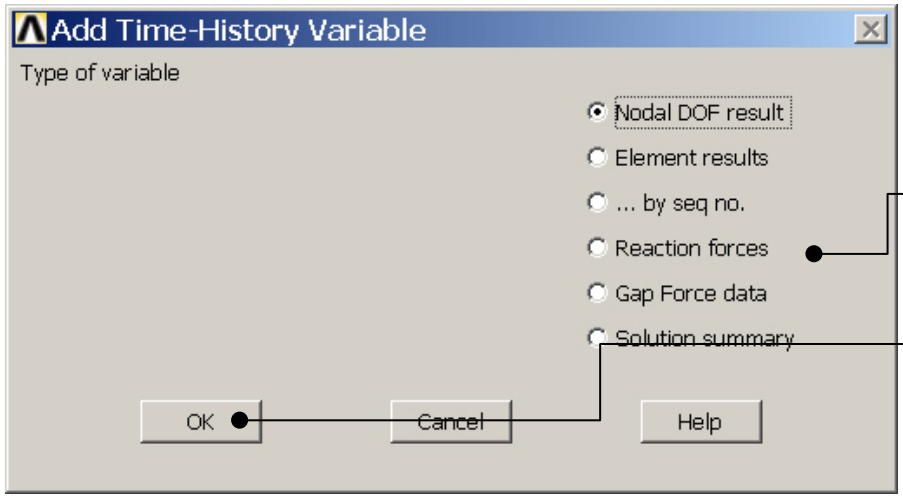
Press OK

Example – Add Time-History Var.

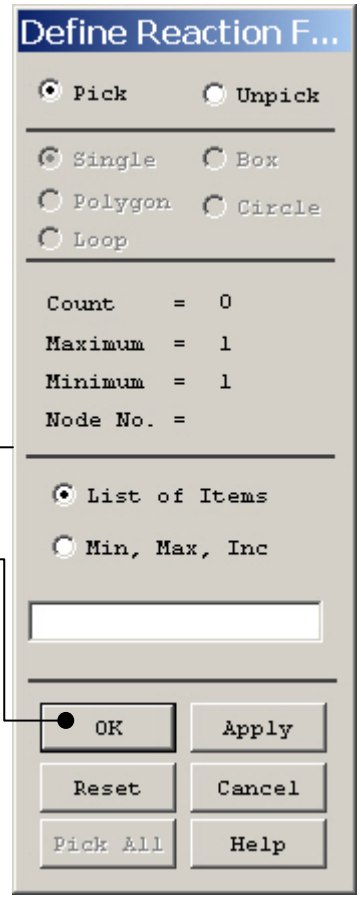


Press Add

Example – Add Time-History Var.

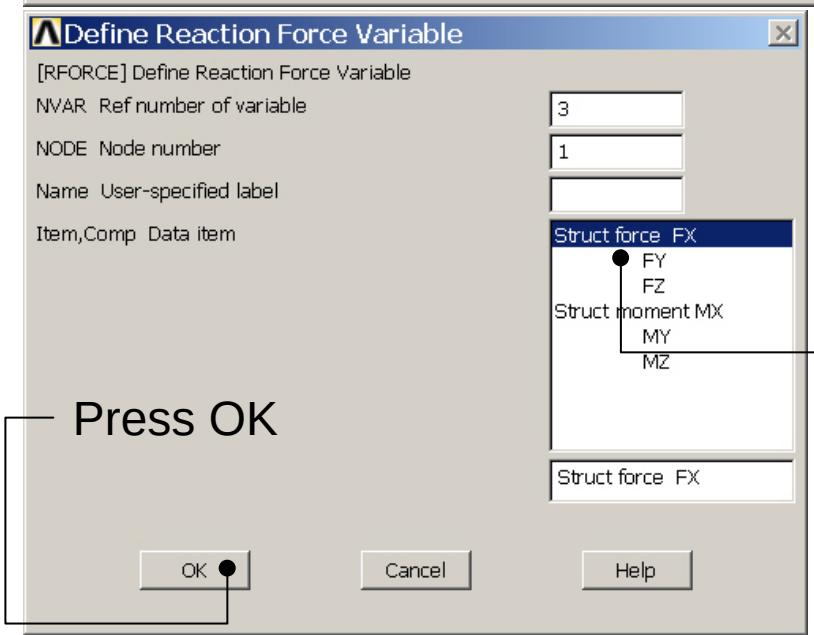


Pick the bottom node



Select Reaction forces

Press OK

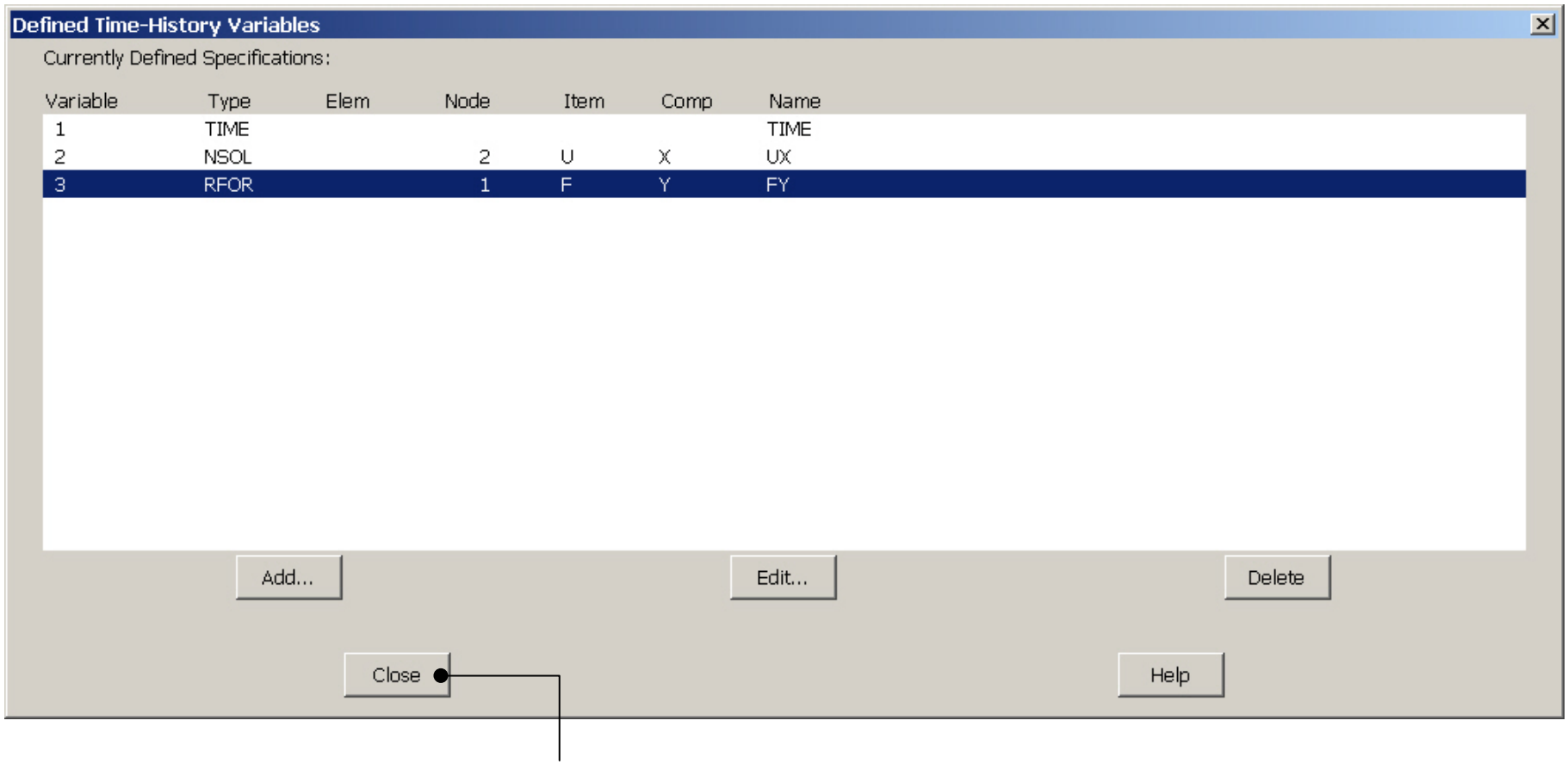


Press OK

Press OK

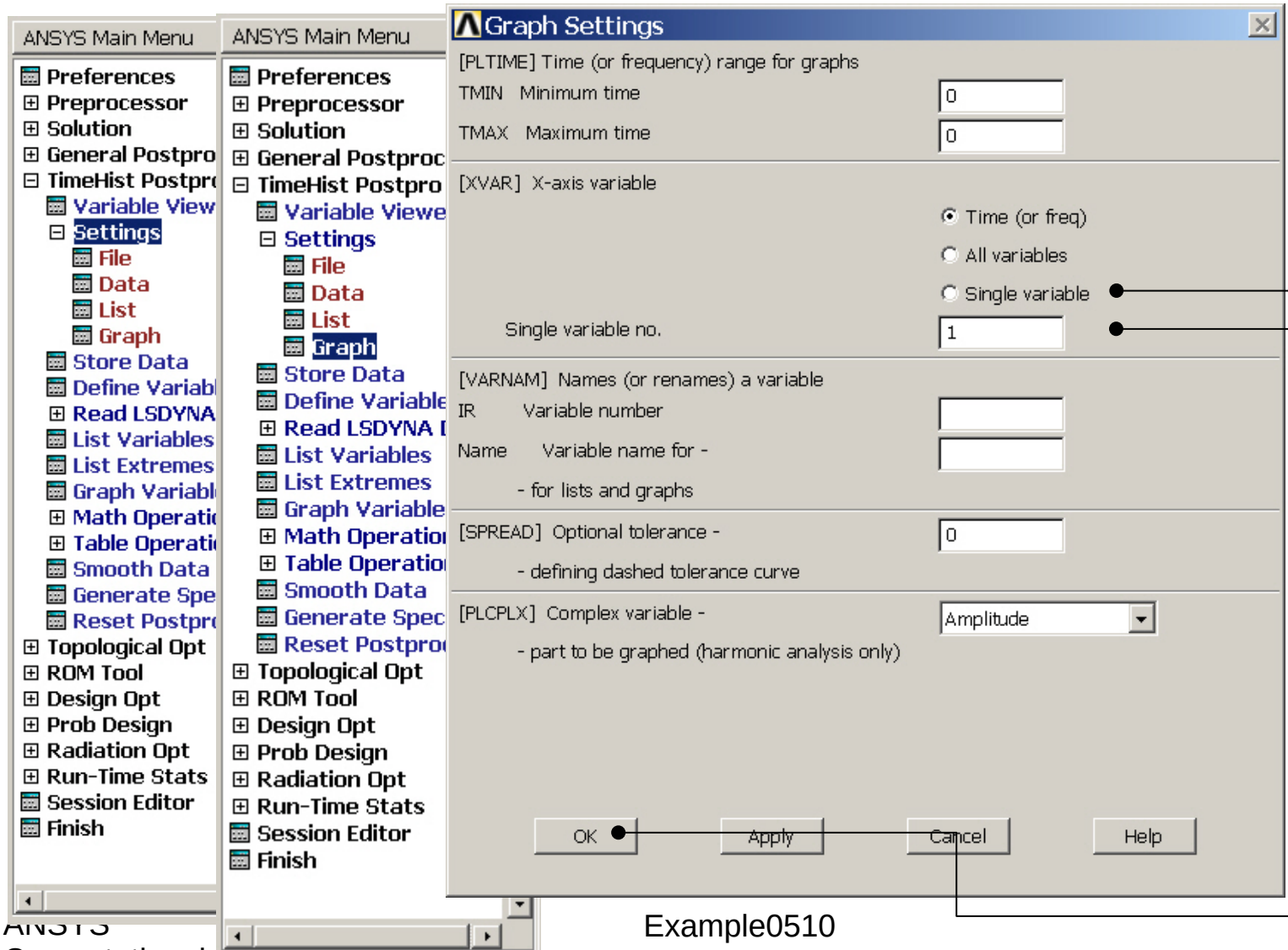
Select Struct force FY

Example – Add Time-History Var.



Press Close

Example - Settings

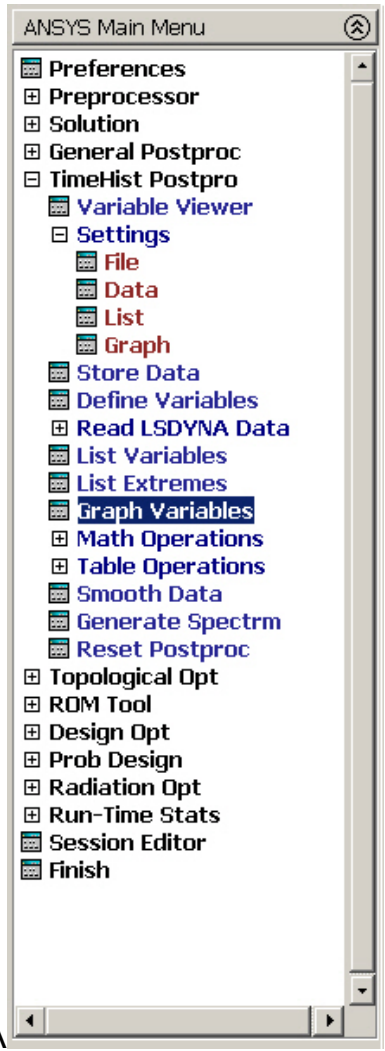


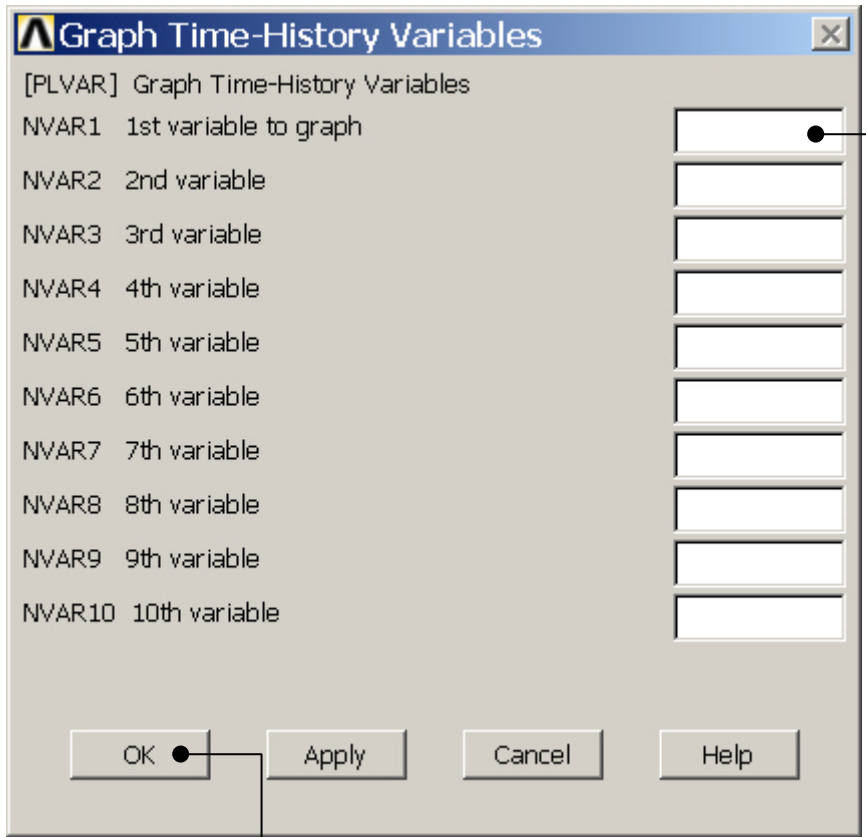
Select Single variable to plot on X-axis

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

Press OK

Example – Graph Variables

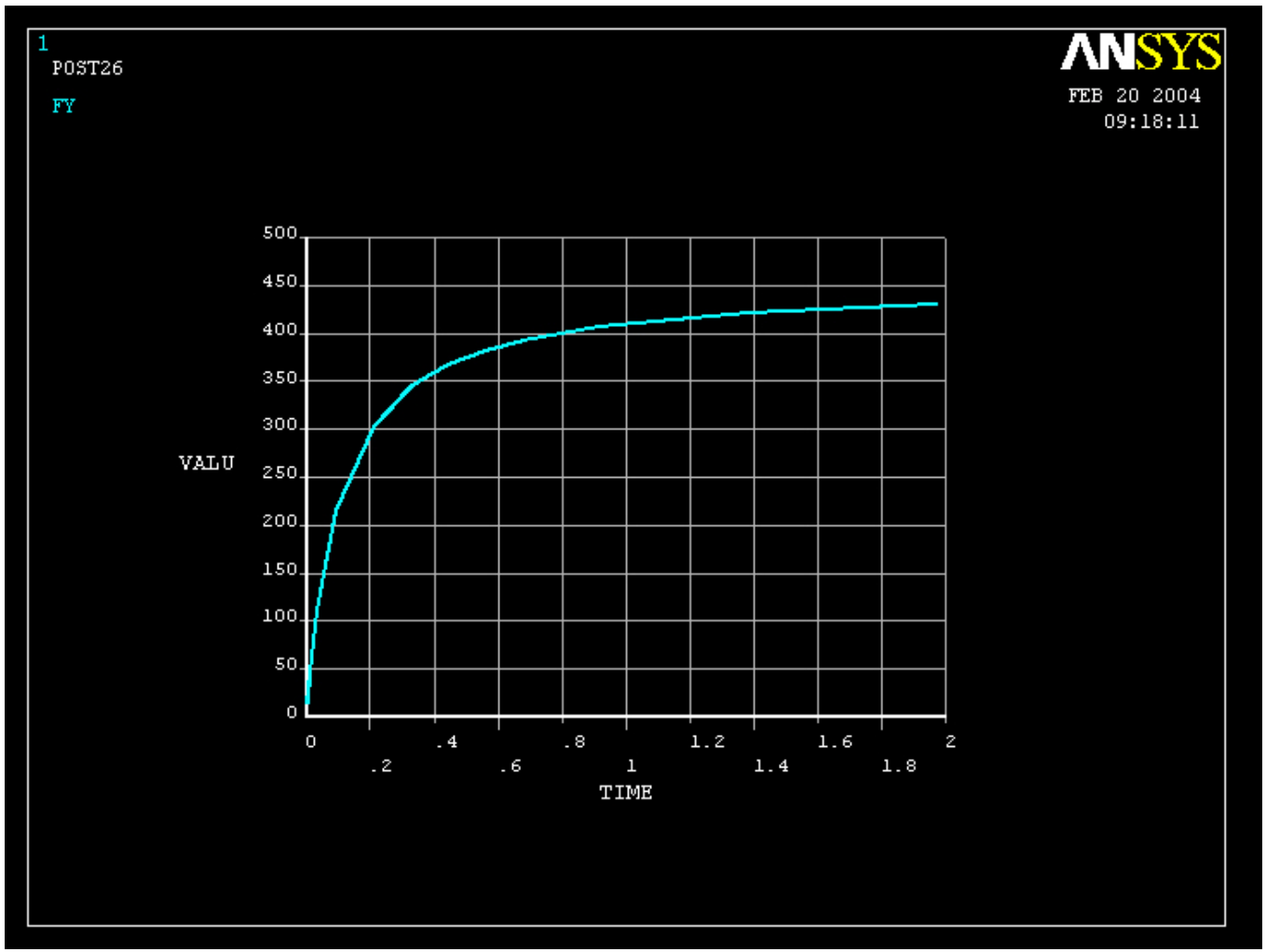




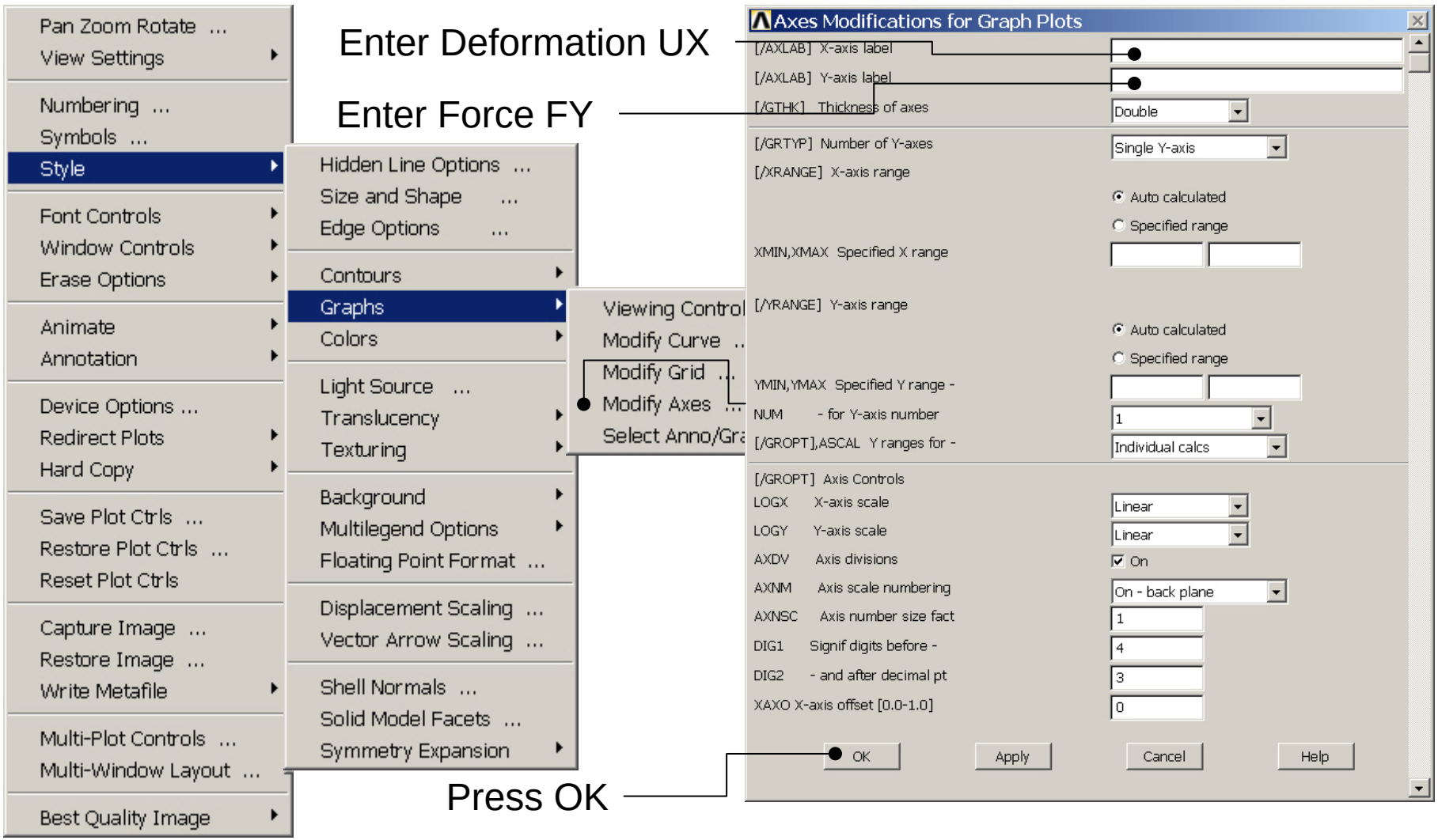
Enter 3 to plot the reaction force FY on the Y-axis

Press OK

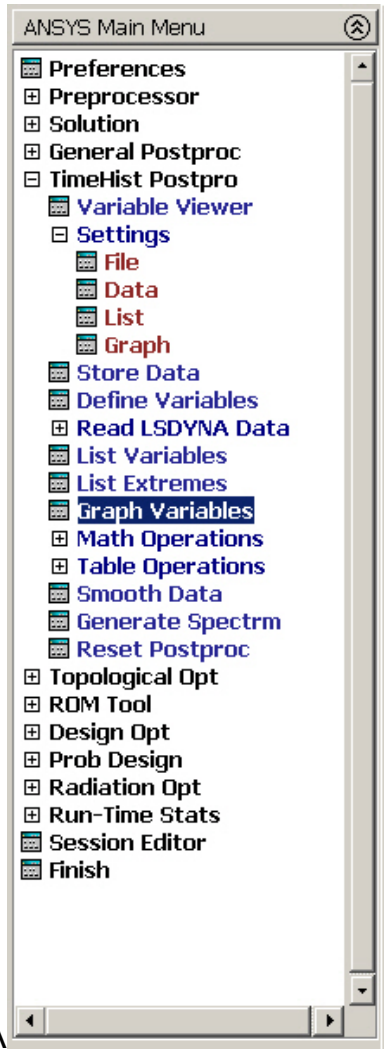
Example – Graph Variables

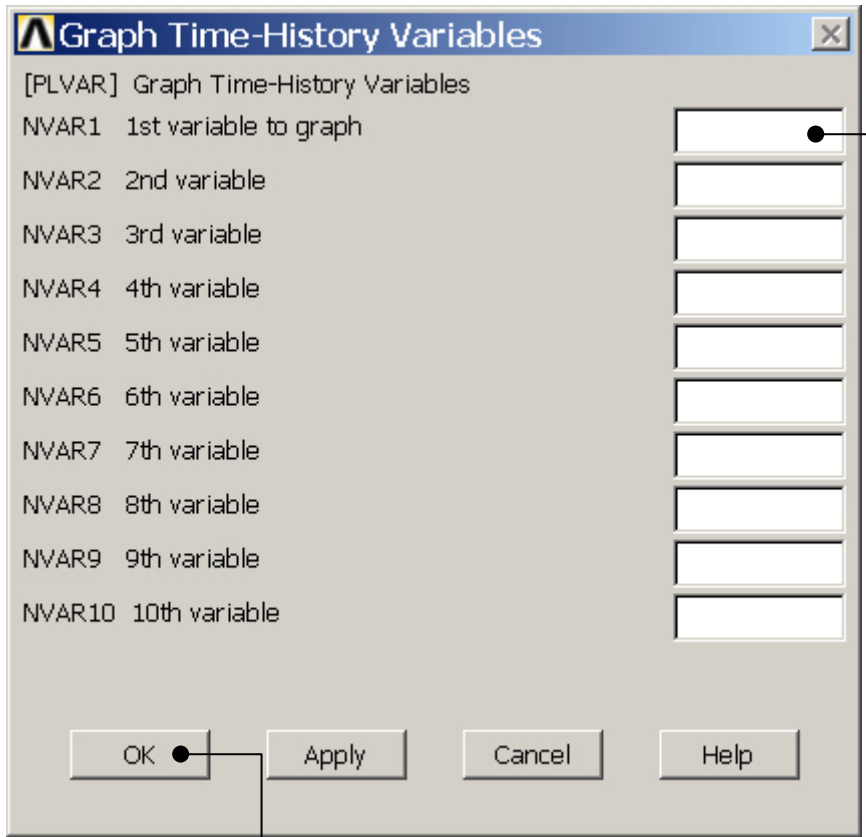


Example – Style - Graph



Example – Graph Variables





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

Press OK

Example - Graph