

## Advanced Training in Nonlinear Analysis

### Objectives:

- 1) How to perform nonlinear analyses in StressCheck (material and general).
- 2) How to use normal springs to simulate contact.
- 3) How to use 2D fastener elements and fastener links.
- 4) How to perform nonlinear events.
- 5) How to perform a nonlinear load step analysis.
- 6) Demonstrate Excel COM example of nonlinear analysis.

### **Session I      2D Material and General Nonlinear, Nonlinear/Excel COM**

- ❑ **Lecture:** “Nonlinear Analysis” (Lecture Nonlinear.pptx)
- ❑ **Exercise:** Build, solve and post-process problem #1. Save as MaterialNLEx1.scp. Compare against 1) Extrude 2) 2D automesh version
  1. Reference: NonlinearTraining.pdf, pages 14-18
- ❑ **Exercise:** Solve and post-process problem #2 and discuss nonlinear events/steps
  1. Reference: NonlinearTraining.pdf, pages 22-31
- ❑ **Exercise:** Build, solve and post-process problem #4 “Cantilever Beam”
  1. Reference: NonlinearTraining.pdf, pages 43-47
- ❑ **Exercise:** Solve and post-process Tutorial Handbook file SingleLapJoint.sci
  1. Reference: NonlinearTraining.pdf, pages 51-54
- ❑ **Demo:** “Nonlinear Analysis via Excel COM” (Nonlinear.xlsm)

### **Session II      3D Material and General Nonlinear, Fastened Connections**

- ❑ **Exercise:** “Performing Nonlinear Events” (Performing Nonlinear Events.pptx)
- ❑ **Exercise:** “Contact with Plasticity Analysis” (ContactPlasticity.pptx)
- ❑ **Demo:** “Simulating Contact via Normal Springs” (ContactNormalSprings.pptx). Demonstrate differences between material and general nonlinear.
- ❑ **Lecture:** “Fastened Structural Connections” (Lecture Fastened Connections.pptx)
- ❑ **Exercise:** Build, solve and post-processing problem #7 “6-Fastener Splice Plate”. Replace rigid connections with links and re-solve problem #7.
  1. Reference: AdvTraining Nonlinear.pdf, pages 59-70