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ME 259(AUG) 3:0
Nonlinear Finite Element Methods

Instructor(s): R Narasimhan

Course description:
Introduction to structural nonlinearities, Newton-Raphson procedure to solve nonlinear equilibrium equations, finite element procedures for 1-D plasticity and visco-plasticity. Return mapping algorithm. Continuum plasticity theory. Stress updated procedures. Treatment of nearly-incompressible deformation. Fundamentals of finite deformation mechanics-kinematics, stress measures, balance laws, objectivity principle, virtual work principle. Finite element procedure for nonlinear elasticity. Lagrangian and spatial formulations. Finite element modeling of contact problems. Finite element programming.

Prerequisites:
ME257 or equivalent course.

Co-requisites:
Student should have working knowledge of Fortran programming

Resources:
1. Bathe, K.J., Finite Element Procedures, Prentice Hall of India, New Delhi 1997.
2. Zienkiewicz, O.C., and Taylor, R.L., The Finite Element Method, Vols. I and II, McGraw Hill, 1991.
3. Belytshko, T., Liu, W.K., and Moran, B., Nonlinear Finite Elements for Continua and Structures, Wiley, 2000.
4. Simo, J.C. and Hughes, T.J.R., Computational Inelasticity, Springer, 1998.

Outcomes:

Additional information:

Course website: