

Introduction to Nonlinear Finite Element Method



Indian Institute of Technology Delhi
Department of Applied Mechanics

TEQIP-III Sponsored Online Short-term Course
1-5 December, 2020

Introduction

- ▶ This online short term (30 hour) course covers interesting topics related to the linear and nonlinear finite element method and application to dynamic, stability, plasticity, visco and hyperelastic problems.
- ▶ The course will cover basics of linear and nonlinear FEM, mathematical background and development of different elements and solution techniques.
- ▶ Problems of geometric and material nonlinearity will be discussed in detail.

Participation

- ▶ This is designed for faculty members and research students (M.Tech. and Ph.D.) of TEQIP-III institutions.
- ▶ There is no registration fee.
- ▶ Participation from outside of TEQIP III institutes is not permitted in this course.
- ▶ Based on first come first serve basis, a maximum of 50 participants will be allowed to register for the course.

Course content

- ▶ Introduction to finite element method, variational principles, strong and weak forms, Ritz and Galerkin methods, discretization of weak form, tension /compression in bars, truss problems, bending of beams and frame problems, isoparametric element and numerical integration
- ▶ Introduction to nonlinear FEM, solution methods, nonlinear dynamic analysis, viscoelasticity, hyperelasticity, impact, plasticity problems, stability problems, snapback problems, arc length methods.

Course coordinator

- ▶ Dr. S. Pradyumna
Associate Professor
Department of Applied Mechanics
Indian Institute of Technology Delhi
Hauz Khas, New Delhi 110016
- ▶ For any query (registration or course content), please send an email to pradyum@iitd.ac.in

Objectives

- ▶ To understand the mathematical and physical background of linear and nonlinear FEM
- ▶ To learn formulation of different elements for nonlinear problems and solution techniques
- ▶ To understand nonlinear static, dynamic, visco-, hyper-elastic and plasticity problems of mechanics.

Faculty

The following faculty, from the Department of Applied Mechanics, IIT Delhi, will be involved in teaching this short term course:

- ▶ Prof. S. Pradyumna
- ▶ Prof. Puneet Mahajan
- ▶ Prof. B. P. Patel
- ▶ Prof. M.K. Singha
- ▶ Prof. Ajeet Kumar
- ▶ Prof. Gaurav Singh

Registration

- ▶ Interested faculty members and research students at TEQIP-III institutions should register by depositing a refundable security deposit of Rs. 2000 ([click here](#) for details regarding payment of the security deposit) before **1st November, 2020**. For the declined participants, we will process reimbursement of refundable deposit.
- ▶ After paying the security deposit, please fill the form with your details along with the transaction details. [Click here](#).