

Finite Element Methods

Introduction

Introduction to the Stiffness Method: Stiffness matrix for spring element, direct stiffness method, boundary conditions

Development of Truss Equations: Stiffness matrix for bar element, approximation function for displacement, global stiffness matrix, solution of a plane truss, potential energy approach

Development of beam Equations: beam stiffness, distributed loading, potential energy approach

Frame and Grid Equations: 2-D arbitrarily oriented element, skewed supports, grid equations, beam element arbitrarily oriented in space, concept of sub-structure analysis

Development of Plane stress and Plane strain Stiffness Equations: Basic concepts of Plane stress and Plane strain, constant-strain triangular element, constant-strain triangular stiffness matrix, plane stress problem

Development of the Linear-Strain Triangle Equations; Axisymmetric Elements; Isoparametric formulation; Three-Dimensional stress analysis; Plate bending element

References:

- 1 Daryl L. Logan, A First Course in the Finite Element Method, Thomson
- 2 R D Cook, D S Malcus, M E Plesha, Concepts and applications of Finite Element Methods
- 3 Chandrupatla and Belegundu, Introduction to Finite Elements in Engineering