

NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Mechanical Engineering - NOC:Computational Continuum Mechanics

Subject Co-ordinator - Prof. Sachin Singh Gautam

Co-ordinating Institute - IIT - Guwahati

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Origin of nonlinearities - 1
Lecture 2 - Origin of nonlinearities - 2
Lecture 3 - Tensor and Tensor Algebra - 1
Lecture 4 - Tensor and Tensor Algebra - 2
Lecture 5 - Tensor and Tensor Algebra - 3
Lecture 6 - Tensor and Tensor Algebra - 4
Lecture 7 - Linearization and directional derivative, Tensor analysis - 1
Lecture 8 - Linearization and directional derivative, Tensor analysis - 2
Lecture 9 - Worked Examples - 1
Lecture 10 - Worked Examples - 2
Lecture 11 - Idea of Motion, Material and Spatial Descriptions, Deformation Gradient Tensor
Lecture 12 - Strain, Polar Decomposition - 1
Lecture 13 - Polar Decomposition - 2, Volume and Area Change
Lecture 14 - Worked Examples, Linearized Kinematics
Lecture 15 - Velocity, Acceleration, Material Time Derivative
Lecture 16 - Velocity Gradient, Rate of Deformation tensor, Area and Volume Rate, Reynolds Transport Theorem
Lecture 17 - Solved Examples
Lecture 18 - Conservation of Mass, Balance of Linear Momentum, Cauchy's Stress Principle - 1
Lecture 19 - Cauchy's Stress Principle - 2, Cauchy Stress Tensor
Lecture 20 - Objectivity, Stress Objectivity, Equilibrium Equations - 1
Lecture 21 - Equilibrium Equations - 2, Principle of Virtual Work
Lecture 22 - Work Conjugacy, First Piola-Kirchhoff Stress Tensor
Lecture 23 - Second Piola-Kirchhoff Stress Tensor, Decomposition of Stress - 1
Lecture 24 - Decomposition of Stress - 2, Objective Stress Measures
Lecture 25 - Solved Examples
Lecture 26 - Constitutive relations and constraints, Hyperelasticity, Material elasticity tensor
Lecture 27 - Spatial Elasticity Tensor, Solved Example
Lecture 28 - Isotropic hyperelasticity - material and spatial description, Hyperelastic models
Lecture 29 - Isotropic Hyperelasticity, Neo-Hookean Material Model, Solved Examples

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- Lecture 30 - Introduction, Linearization Process Overview
- Lecture 31 - Linearization of Internal Virtual Work and External Virtual Work
- Lecture 32 - Discretization of Kinematic Quantities, Equilibrium Equations
- Lecture 33 - Discretization of Linearized Equilibrium Equations
- Lecture 34 - Newton Raphson Method
- Lecture 35 - Line Search Method
- Lecture 36 - Arc Length Method, Solved Examples
- Lecture 37 - FE Formulation of Ductile Fracture in Dynamic Elasto-Plastic Contact Problem - Introduction
- Lecture 38 - FE Formulation of Ductile Fracture in Dynamic Elasto-Plastic Contact Problem - Formulation
- Lecture 39 - FE Formulation of Ductile Fracture in Dynamic Elasto-Plastic Contact Problem - FEM
- Lecture 40 - FE Formulation of Ductile Fracture in Dynamic Elasto-Plastic Contact Problem - Results