NPTEL Video Course - Mechanical Engineering - NOC:Optical Methods for Solid and Fluid Mechanics

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Co-ordinating Institute - IISc - Bangalore

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

Lecture 1 - Introduction
Lecture 2 - Mathematical Preliminaries - I
Lecture 3 - Tensors and Deformations
Lecture 4 - Lagrangian and Eulerian Perspectives
Lecture 5 - Mathematical Preliminaries - II
Lecture 6 - Image Processing Preliminaries
Lecture 7 - Image Processing Operations
Lecture 8 - Light Matter Interaction - I
Lecture 9 - Lab Demo I: Optical Microscope
Lecture 10 - Optical System: Lenses
Lecture 11 - Lab Demo II: Lenses and Camera
Lecture 12 - Light Matter Interaction - II (Lab Demostration)
Lecture 13 - Light Matter Interaction - II (Lab Demostration)
Lecture 14 - Tracer Particles for Flow Visualisation
Lecture 15 - Particle Tracking Velocimetry
Lecture 16 - Particle Image Velocimetry - I
Lecture 17 - Particle Image Velocimetry - II
Lecture 18 - Particle Image Velocimetry - III
Lecture 19 - Particle Image Velocimetry - IV
Lecture 20 - Particle Image Velocimetry - V
Lecture 21 - Particle Image Velocimetry - VI
Lecture 22 - Schlieren and Shadowgraphy
Lecture 23 - Lab Demo III: PIV and Schlieren
Lecture 24 - Introduction to optical methods for solids
Lecture 25 - Basics of Digital Image Correlation
Lecture 26 - Iterative implementation of DIC
Lecture 27 - Example implementations
Lecture 28 - How is a DIC experiment set up ?
Lecture 29 - DIY(C)!

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Lecture 30 - Introduction to Photoelasticity
Lecture 31 - Why do we see fringes ?
Lecture 32 - How does light interact with matter ?
Lecture 33 - Origin of Birefringence
Lecture 34 - Loaded sample in a polarizer
Lecture 35 - Stress-induced birefringence
Lecture 36 - Analyses of optical paths using matrix methods
Lecture 37 - Putting it all together
Lecture 38 - What is tomography ?
Lecture 39 - Signal processing and Fourier methods
Lecture 40 - Rays and the Radon transforms
Lecture 41 - Geometric interpretations
Lecture 42 - The inverse problem: From Radon transform to 2D cross-section
Lecture 43 - Cone beams, parallel beams and the Feldkamp algorithm
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