

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

NPTEL Video Course - Aerospace Engineering - NOC:Fundamentals of Theoretical and Experimental Aerodynamics

Subject Co-ordinator - Prof. Arnab Roy

Co-ordinating Institute - IIT - Kharagpur

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

- Lecture 1 - Introduction on Aerodynamics-its relevance and applications
- Lecture 2 - Atmosphere
- Lecture 3 - Flow velocity, pressure, skin friction
- Lecture 4 - Generation of aerodynamic forces and moments on an aircraft
- Lecture 5 - Generation of aerodynamic forces and moments on an aircraft (Continued...)
- Lecture 6 - Generation of aerodynamic forces and moments on an aircraft (Continued...)
- Lecture 7 - Eulerian and Lagrangian perspectives of flow: Fluid element trajectories
- Lecture 8 - Fluid element trajectories, Angular velocity, and vorticity
- Lecture 9 - Irrotational and Rotational flow, Strain of a fluid element, Gradient
- Lecture 10 - Line Surface and Volume Integrals, Circulation, Velocity
- Lecture 11 - Conservation equations of mass, momentum and energy
- Lecture 12 - Conservation equations of momentum and energy
- Lecture 13 - Inviscid and viscous flows
- Lecture 14 - Inviscid and viscous flows (Continued...)
- Lecture 15 - Bernoulli's equation and its applications
- Lecture 16 - Bernoulli's equation applications; Potential flow; Boundary layer flow
- Lecture 17 - Boundary layer flow
- Lecture 18 - Boundary Layer (Continued...) and Laminar and turbulent flow
- Lecture 19 - Airfoil Geometry, forces and moments acting on an airfoil
- Lecture 20 - Pressure distribution on an airfoil, Airfoil nomenclature and characteristics
- Lecture 21 - Airfoil characteristics; Aerodynamic center; Some more elementary flows
- Lecture 22 - Elementary flows- Doublet and Point Vortex; Vortex sheet
- Lecture 23 - Kutta condition; Kelvin's circulation theorem; Introduction to thin airfoil theory
- Lecture 24 - Results of thin airfoil theory for symmetric
- Lecture 25 - Multi element airfoils, Laminar and turbulent
- Lecture 26 - Finite wing geometry and flow features
- Lecture 27 - Biot Savart Law; Prandtl's lifting line theory
- Lecture 28 - Prandtl lifting theory for finite wings
- Lecture 29 - Finite wing aerodynamics; Delta wing aerodynamics

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- Lecture 30 - Delta wing aerodynamics; Unsteady aerodynamics
- Lecture 31 - Fundamentals of high speed flows
- Lecture 32 - Velocity potential equation and its application; Finite Waves
- Lecture 33 - Normal shocks
- Lecture 34 - Normal shocks, Mach waves and oblique shocks
- Lecture 35 - Oblique shock; Prandtl Meyer expansion
- Lecture 36 - Shock expansion theory; Flow through converging diverging nozzle
- Lecture 37 - Flow through converging diverging nozzle under different back pressure
- Lecture 38 - Preliminary concepts of hypersonic flow; Shock tube
- Lecture 39 - Computing aerodynamic flows - trying to connect with the theory
- Lecture 40 - Computing aerodynamic flows - trying to connect with the theory (Continued...)
- Lecture 41 - Some more on flow physics; The different steps involved in flow computations
- Lecture 42 - An introduction to Panel Method
- Lecture 43 - Panel method and Vortex Lattice Method
- Lecture 44 - Mathematical classification of PDEs and their physical behavior
- Lecture 45 - Basics of grid and discretization of governing PDEs
- Lecture 46 - Different aspects of numerical schemes
- Lecture 47 - Basics of Euler Equation
- Lecture 48 - Basics of Compressible Navier Stokes Equations
- Lecture 49 - Wind tunnel-an experimental tool in aerodynamics; Types of wind tunnels
- Lecture 50 - Wind Tunnel design basics - Subsonic Wind Tunnels
- Lecture 51 - Wind Tunnel design basics - Subsonic wind tunnels (Continued...)
- Lecture 52 - Wind Tunnel design basics - Supersonic wind tunnels
- Lecture 53 - Continuous closed circuit supersonic wind tunnel
- Lecture 54 - Scaling of wind tunnel models; Safety issues in wind tunnel handling
- Lecture 55 - Flow visualization techniques
- Lecture 56 - Schlieren and Shadowgraph techniques
- Lecture 57 - Measurement of Pressure using mechanical instruments
- Lecture 58 - Rayleigh Pitot tube; Drag measurement using wake survey and direct weighing method
- Lecture 59 - Mechanical balance
- Lecture 60 - Electronic transducers
- Lecture 61 - Wheatstone bridge circuits for force and moment measurement
- Lecture 62 - Strain gauge based balances; Electronic pressure gauges
- Lecture 63 - Absolute-Gauge-Differential pressure sensors; Data Acquisition System
- Lecture 64 - Measurement error and uncertainty
- Lecture 65 - Velocity measurement using Particle Image Velocimetry
- Lecture 66 - Velocity measurement using Particle Image Velocimetry (Continued...)
- Lecture 67 - Particle image velocimetry (Continued...)
- Lecture 68 - How wind tunnel and associated instrumentation are used

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Lecture 69 - Quick recapitulation of course content and closure