

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

NPTEL Video Course - Physics - N0C:Fluid Dynamics for Astrophysics

Subject Co-ordinator - Prof. Prasad Subramanian

Co-ordinating Institute - IISER - Pune

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

- Lecture 1 - Introduction to the course
- Lecture 2 - Continuum hypothesis, distribution function and stress-viscosity relation
- Lecture 3 - Continuum hypothesis, distribution function and stress-viscosity relation - Recap
- Lecture 4 - Fluid Kinematics
- Lecture 5 - Fluid Kinematics - Recap
- Lecture 6 - Conservation laws: Mass conservation and incompressibility
- Lecture 7 - Conservation laws: Momentum conservation and Euler equation
- Lecture 8 - Conservation laws - Recap
- Lecture 9 - Potential flows
- Lecture 10 - Bernoulli constant, its applications and vorticity equation
- Lecture 11 - Recap - Potential flows, Bernoulli constant and its applications
- Lecture 12 - Vorticity dynamics -- Kelvin's vorticity theorem and Magnus effect
- Lecture 13 - Navier-Stokes equation
- Lecture 14 - Navier-Stokes equation (Continued....) and energy equation
- Lecture 15 - Energy equation in a conservative form
- Lecture 16 - Boundary conditions in Navier-Stokes equation, d'Alembert's paradox
- Lecture 17 - Poiseuille flow, deriving viscosity from microscopics
- Lecture 18 - Dimensionless numbers -- Mach number, Reynolds number
- Lecture 19 - Dimensionless numbers (Continued...) -- plasma beta, magnetic Reynolds number, Alfvén Mach number
- Lecture 20 - Reynolds number and dynamic similarity
- Lecture 21 - Reynolds number recap, Low Re flows, and drag on a sphere (Stokes law)
- Lecture 22 - High Re flows -- turbulent drag law, vortex shedding and drag crisis
- Lecture 23 - Lift on a body, introduction to compressible flows
- Lecture 24 - Compressible flows -- derivation of sound speed and dispersion relation
- Lecture 25 - Subsonic and supersonic flows
- Lecture 26 - Propagation of sonic information, shock tube problem and piston problem
- Lecture 27 - Criterion for neglect of compressibility, method of characteristics
- Lecture 28 - Shock thickness
- Lecture 29 - Shock thickness recap, shock jump conditions

Get DIGIMAT For High-Speed Video Streaming of NPTEL and Educational Video Courses in LAN

<http://www.digimat.in>

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

- Lecture 30 - Shock jump conditions (Continued...), transonic 1D flows, converging/diverging channels
- Lecture 31 - Coverging/diverging channels, de Laval nozzle and its application to astrophysical jets
- Lecture 32 - Spherically symmetric transonic flows
- Lecture 33 - Spherically symmetric transonic flows (Continued...)
- Lecture 34 - Solar wind : Parker's solution
- Lecture 35 - Solar wind : Modifications in Parker's solution
- Lecture 36 - Spherical accretion onto a compact object : Eddington luminosity and accretion rate
- Lecture 37 - Spherical accretion onto a compact object : Solutions for flow properties
- Lecture 38 - Spherical accretion (Continued...), disk accretion--Roche lobe overflow
- Lecture 39 - Disk accretion : Mass conservation and vertical hydrostatic equilibrium
- Lecture 40 - Disk accretion : Removal of angular momentum, Shakura-Sunyaev viscosity parameter
- Lecture 41 - Disk accretion : Viscous dissipation and the energy equation, two-temperature criterion
- Lecture 42 - Particle acceleration in astrophysical settings : Shocks and non-thermal energy distribution
- Lecture 43 - Particle acceleration in astrophysical settings : Diffusive shock acceleration
- Lecture 44 - Spherical blast waves : Bomb explosion and supernova explosion
- Lecture 45 - Spherical blast waves : Sedov-Taylor solution
- Lecture 46 - Spherical blast waves : Sedov-Taylor solution (Continued....)
- Lecture 47 - Magnetohydrodynamics (MHD) : Introduction
- Lecture 48 - Magnetohydrodynamics (MHD) : The induction equation
- Lecture 49 - Magnetohydrodynamics (MHD) : Currents in MHD, momentum equation and magnetic stress tensor
- Lecture 50 - Magnetohydrodynamics (MHD) : Magnetic stresses and magnetic buoyancy
- Lecture 51 - Magnetohydrodynamics (MHD) : Plasma beta, force-free fields and potential configurations
- Lecture 52 - Magnetohydrodynamics (MHD) : Magnetic flux-freezing
- Lecture 53 - Magnetohydrodynamics (MHD) : Magnetic flux-freezing (Continued....), magnetic dynamos
- Lecture 54 - Magnetohydrodynamics (MHD) : Dynamo theory
- Lecture 55 - Magnetohydrodynamics (MHD) : Waves in MHD - Alfven waves
- Lecture 56 - Magnetohydrodynamics (MHD) : Waves in MHD - Alfven waves and magnetosonic waves
- Lecture 57 - Magnetohydrodynamics (MHD) : Waves in MHD - Magnetosonic waves
- Lecture 58 - Magnetohydrodynamics (MHD) : Shocks in MHD
- Lecture 59 - Magnetohydrodynamics (MHD) : Shocks in MHD - Shock jump conditions
- Lecture 60 - Non-ideal MHD : Introduction to magnetic reconnection
- Lecture 61 - Non-ideal MHD : Magnetic reconnection - The Sweet-Parker model
- Lecture 62 - Non-ideal MHD : Magnetic reconnection - The Petscheck model
- Lecture 63 - Sun's atmosphere : Solar corona and the coronal heating problem
- Lecture 64 - Solar eruptions : Coronal Mass Ejections (CMEs) and solar flares