

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

NPTEL Video Course - Chemical Engineering - NOC:Computational Fluid Dynamics

Subject Co-ordinator - Prof. Sreenivas Jayanti

Co-ordinating Institute - IIT - Madras

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

- Lecture 1 - Motivation
- Lecture 2 - Flow in a rectangular duct
- Lecture 3 - Flow in a rectangular duct
- Lecture 4 - Tutorial 1
- Lecture 5 - Tutorial 1 (Continued...) Solution for algebraic equations using Gauss- Seidel Method
- Lecture 6 - Flow in a triangular duct
- Lecture 7 - Flow in a triangular duct
- Lecture 8 - Tutorial 2
- Lecture 9 - Tutorial 2 (Continued...) Description of FV method and solution using G-S Method
- Lecture 10 - Effect of grid spacing & upcoming course outline
- Lecture 11 - Mass conservation equations
- Lecture 12 - Momentum conservation equations
- Lecture 13 - Forces acting on control volume
- Lecture 14 - Kinematics of deformation in fluid flow
- Lecture 15 - Equations governing fluid flow in incompressible fluid
- Lecture 16 - Navier-Stokes equation for simple cases of flow
- Lecture 17 - Energy conservation equations
- Lecture 18 - Practical cases of fluid flow with heat transfer in CFD point of view
- Lecture 19 - Practical cases of fluid flow with mass transfer in CFD point of view
- Lecture 20 - Equations governing fluid flow with chemical reactions
- Lecture 21 - Concept of wellposedness of mathematical problems
- Lecture 22 - Introduction to finite difference methods
- Lecture 23 - Finite difference approximation on an uniform mesh
- Lecture 24 - Higher order and mixed derivatives
- Lecture 25 - Solution of Poisson equation in rectangular duct-Tutorial
- Lecture 26 - Discretization of time domain
- Lecture 27 - FD approx. on a non-uniform mesh and need of analysis of obtained discretization
- Lecture 28 - Need for the analysis of discretized equation
- Lecture 29 - Properties of Numerical Schemes

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- Lecture 30 - Properties of Numerical Schemes
- Lecture 31 - Tutorial on Stability Analysis
- Lecture 32 - Analysis of Generic 1-d scalar transport equation
- Lecture 33 - Introduction to the solution of coupled N-S equations
- Lecture 34 - N-S equation in compressible flow- Mac Cormack Scheme
- Lecture 35 - Stability limits of Mac-Cormack Scheme and the intro to Beam-Warming Scheme
- Lecture 36 - Implicit Beam-Warming Scheme
- Lecture 37 - Compressible flow to Incompressible flow
- Lecture 38 - Solution of coupled equations
- Lecture 39 - Artificial compressibility method, Stream function-vorticity method
- Lecture 40 - Pressure equation method, Staggered grid system
- Lecture 41 - Pressure Correction Method
- Lecture 42 - Tutorial on Pressure Correction Method
- Lecture 43 - Tutorial on Pressure Correction Method (Continued...)
- Lecture 44 - Introduction to the basic numerical methods
- Lecture 45 - Direct Methods
- Lecture 46 - Tri-diagonal Matrix Algorithm
- Lecture 47 - TDMA and other iterative methods
- Lecture 48 - Recap of basic iterative methods.
- Lecture 49 - Convergence analysis of basic iterative methods
- Lecture 50 - Successive Over Relaxation (SOR) method
- Lecture 51 - Alternating Direction Implicit (ADI) method
- Lecture 52 - Strongly Implicit Procedure (ILU) method
- Lecture 53 - Multigrid method
- Lecture 54 - Body Fitted Grid Approach
- Lecture 55 - Formulation Of Finite Volume Method
- Lecture 56 - Methods For Unstructured Grid Generation
- Lecture 57 - Triangulation
- Lecture 58 - The Advancing Front Method continuation
- Lecture 59 - Time and length scale of turbulence
- Lecture 60 - The turbulent closure problem
- Lecture 61 - The generic formulation for turbulence
- Lecture 62 - More generic formulation and summary