INTRODUCTION TO FINITE VOLUME METHODS - I

AEROSPACE ENGINEERING

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TYPE OF COURSE : New | Elective | UG/PG
COURSE DURATION : 8 weeks (27 Aug'18 - 19 Oct'18)
INTENDED AUDIENCE : B.E/B.Tech, M.E/M.Tech, Ph.D
EXAM DATE : 28 Oct 2018
PRE-REQUISITES : Fluid Mechanics, Basic Programming, Linear Algebra, PDEs

INDUSTRIES APPLICABLE TO : Aerospace, Automobile, Chemical and Power Generation and Defense Industries

COURSE OUTLINE :

The Finite Volume Method (FVM) is one of the widely used numerical techniques in the scientific community and in industry as well. In this approach, the partial differential equations that represent the conservation laws to simulate fluid flow, heat transfer, and other related physical phenomena, are transformed over differential volumes into discrete algebraic equations over finite volumes (or elements or cells). Thereafter, the system of algebraic equations is solved to compute the values of the dependent variable for each of the elements to represent the physical processes.

ABOUT INSTRUCTOR :

Dr. Ashoke De is currently working as Associate Professor in the Department of Aerospace Engineering at Indian Institute of Technology Kanpur. He leads large scale initiatives in the modeling of turbulent reacting and non-reacting flows at IIT Kanpur. So far, he has authored more than 90 peer reviewed articles in journals and conferences. His primary research focus is the emerging field of computational mechanics with particular interest in combustion and turbulent flows.

COURSE PLAN :

Week 01 : Introduction, Classification of PDEs, Governing Equations
Week 02 : Governing Equations (contd.), Discretization process, Taylor Series
Week 03 : Derivatives, Errors
Week 04 : FVM Methods
Week 05 : FVM Mesh
Week 06 : Discretization of Diffusion Equations - Structured
Week 07 : Discretization of Diffusion Equations - Unstructured
Week 08 : Gradient Calculation