



# Basic Control Volume Finite Element Methods For Fluids And Solids (Iisc Research Monographs)

*Vaughan R Voller*

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## Basic Control Volume Finite Element Methods For Fluids And Solids (Iisc Research Monographs)

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The Control Volume Finite Element Method (CVFEM) is a hybrid numerical method, combining the physics intuition of Control Volume Methods with the geometric flexibility of Finite Element Methods. The concept of this monograph is to introduce a common framework for the CVFEM solution so that it can be applied to both fluid flow and solid mechanics problems. To emphasize the essential ingredients, discussion focuses on the application to problems in two-dimensional domains which are discretized with linear-triangular meshes. This allows for a straightforward provision of the key information required to fully construct working CVFEM solutions of basic fluid flow and solid mechanics problems.

Contents: Governing Equations; The Essential Ingredients in a Numerical Solution; Control Volume Finite Element Data Structure; Control Volume Finite Element Method (CVFEM) Discretization and Solution; The Control Volume Finite Difference Method; Analytical and CVFEM Solutions of Advection-Diffusion Equations; A Plane Stress CVFEM Solution; CVFEM Stream Function-Vorticity Solution for a Lid Driven Cavity Flow; Notes Toward the Development of a 3-D CVFEM Code.

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