

FINITE DIFFERENCE METHODS

Part Two presents the finite difference methods (FDM) and topics related to finite difference approximations. The subjects to be covered here include basic concepts of finite difference theory, various formulation strategies, and applications to incompressible and compressible flows. Finite volume methods (FVM) via FDM are also presented.

Although FDM as applied to CFD is widespread and many textbooks are available, the purpose of Part Two is to make detailed comparisons with other methods such as finite element methods (FEM) to be presented in Part Three (particularly in Chapter 16) for the benefit of the beginner and the practitioner alike. Historical developments, traditional treatments of finite difference methods, and some recent advancements are presented for this reason.

Chapter 3 discusses derivations of finite difference equations, followed in Chapter 4 by various finite difference schemes for solutions of elliptic, parabolic, hyperbolic, and Burgers' equations. General fluid dynamics problems of incompressible and compressible flows are presented in Chapters 5 and 6, respectively. Finally, finite volume methods (FVM) via FDM are discussed in Chapter 7.

