Computational Fluid Dynamics. Edition No. 2

Description: The second edition of Computational Fluid Dynamics represents a significant improvement from the first edition. However, the original idea of including all computational fluid dynamics methods (FDM, FEM, FVM); all mesh generation schemes; and physical applications to turbulence, combustion, acoustics, radiative heat transfer, multiphase flow, electromagnetic flow, and general relativity is still maintained. The second edition includes a new section on preconditioning for EBE-GMRES and a complete revision of the section on flowfield-dependent variation methods, which demonstrates more detailed computational processes and includes additional example problems. For those instructors desiring a textbook that contains homework assignments, a variety of problems for FDM, FEM and FVM are included in an appendix. To facilitate students and practitioners intending to develop a large-scale computer code, an example of FORTRAN code capable of solving compressible, incompressible, viscous, inviscid, 1D, 2D and 3D for all speed regimes using the flowfield-dependent variation method is made available.

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1. Introduction;
2. Governing equations;

Part II - Finite Difference Methods:
3. Derivation of finite difference equations;
4. Solution methods of finite difference equations;
5. Incompressible viscous flows via finite difference methods;
6. Compressible flows via finite difference methods;
7. Finite volume methods via finite difference methods;

Part III - Finite Element Methods:
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11. Nonlinear problems/convection-dominated flows;
12. Incompressible viscous flows via finite element methods;
13. Compressible flows via finite element methods;
14. Miscellaneous weighted residual methods;
15. Finite volume methods via finite element methods;
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Part IV - Automatic Grid Generation, Adaptive Methods and Computing Techniques:
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23. Applications to acoustics;
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25. Applications to multiphase flows;
26. Applications to electromagnetic flows;
27. Applications to relativistic astrophysical flows; Appendices.

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