John F. Wendt (Ed.)

Computational Fluid Dynamics

An Introduction

With Contributions by
John D. Anderson Jr., Joris Degroote, Gérard Degrez, Erik Dick,
Roger Grundmann and Jan Vierendeels

Third Edition

Springer

Contents

Part I

1 **Basic Philosophy of CFD** 3
J.D. Anderson, Jr.

2 **Governing Equations of Fluid Dynamics** 15
J.D. Anderson, Jr.

3 **Incompressible Inviscid Flows: Source and Vortex Panel Methods** ... 53
J.D. Anderson, Jr.

4 **Mathematical Properties of the Fluid Dynamic Equations** 77
J.D. Anderson, Jr.

5 **Discretization of Partial Differential Equations** 87
J.D. Anderson, Jr.

6 **Transformations and Grids** 105
J.D. Anderson, Jr.

7 **Explicit Finite Difference Methods: Some Selected Applications to Inviscid and Viscous Flows** 127
J.D. Anderson, Jr.

Part II

8 **Boundary Layer Equations and Methods of Solution** 153
R. Grundmann

9 **Implicit Time-Dependent Methods for Inviscid and Viscous Compressible Flows, with a Discussion of the Concept of Numerical Dissipation** 183
G. Degrez

10 Introduction to Finite Element Methods in Computational Fluid Dynamics 235
E. Dick

11 Introduction to Finite Volume Methods in Computational Fluid Dynamics 275
E. Dick

Part III

12 Aspects of CFD Computations with Commercial Packages 305
J. Vierendeels and J. Degroote

Index 329