

Preface

Computational Fluid Dynamics: An Introduction grew out of a von Karman Institute (VKI) Lecture Series by the same title first presented in 1985 and repeated with modifications every year since that time.

The objective, then and now, was to present the subject of computational fluid dynamics (CFD) to an audience unfamiliar with all but the most basic numerical techniques and to do so in such a way that the practical application of CFD would become clear to everyone.

A second edition appeared in 1995 with updates to all the chapters and when that printing came to an end, the publisher requested that the editor and authors consider the preparation of a third edition. Happily, the authors received the request with enthusiasm.

The third edition has the goal of presenting additional updates and clarifications while preserving the introductory nature of the material.

The book is divided into three parts. John Anderson lays out the subject in Part I by first describing the governing equations of fluid dynamics, concentrating on their mathematical properties which contain the keys to the choice of the numerical approach. Methods of discretizing the equations are discussed and transformation techniques and grids are presented. Two examples of numerical methods close out this part of the book: source and vortex panel methods and the explicit method.

Part II is devoted to four self-contained chapters on more advanced material. Roger Grundmann treats the boundary layer equations and methods of solution. Gerard Degrez treats implicit time-marching methods for inviscid and viscous compressible flows; relative to the second edition, figures in the section on stability properties have been added and the section on numerical dissipation has been expanded with examples. Eric Dick, in two separate articles, treats both finite volume and finite element methods; the sections on current developments have been updated and references to a number of essential recent publications have been added.

Part III brings a new contribution by Jan Vierendeels and Joris Degroote which provides insight into the steps that are needed to obtain a CFD solution of a flow field using commercial CFD software packages. The wide availability of such codes

provides advantages for the non-specialist in numerical techniques, but requires an appreciation of their limitations and knowledge of an application methodology.

The editor and authors will consider this book to have been successful if the readers conclude they have been well prepared to examine the literature in the field and to begin the application of CFD methods to the resolution of problems in their area of interest.

The editor takes this opportunity to thank the authors for their contributions to this book and for their enthusiasm to continue the tradition of continually improving the VKI Lecture Series on which it is based.

Eagle River, WI, USA

John F. Wendt



<http://www.springer.com/978-3-540-85055-7>

Computational Fluid Dynamics

An Introduction

Wendt, J. (Ed.)

2009, XII, 332 p. 216 illus., Hardcover

ISBN: 978-3-540-85055-7