Fundamentals of Multiphase Flow
Christopher L. E. Brennen
California Institute of Technology, USA

Multiphase flows are flows of mixtures of separate substances, such as bubbles of gas in liquids, solid particles in air, and so on. They are abundant in nature, in industrial processes and in our bodies. This book provides a coherent and unified treatment of multiphase flows with an emphasis on the underlying physical phenomena. It is intended as an important reference text both for researchers and engineers who must deal with the problems of multiphase flows and for scientists interested in the basic phenomena.

Features
• Focus is on presenting a unified treatment of the fundamentals of multiphase flows
• Emphasizes the practical importance of multiphase flows
• Emphasizes the ubiquity of multiphase flows and the range of contexts in which they need to be understood

Contents:

June 2005   368pp   195 illustrations
0 521 84804 0 Hardback £50.00

Measurement in Fluid Mechanics
Stavros Tavoularis
University of Ottawa, Canada

An introductory, up-to-date, general reference in experimental fluid mechanics, featuring classical and state-of-the-art methods for flow visualization and for measuring flow rate, pressure, velocity, temperature, concentration and wall shear stress. While particularly suitable as a textbook for graduate and advanced undergraduate courses, Measurement in Fluid Mechanics is also a valuable tool for practising engineers and applied scientists. This book is written by a single author, in a consistent and straightforward style, with plenty of clear illustrations, an extensive bibliography and over one hundred suggested exercises.

Features
• Single-authored book provides a consistent description of most available measurement methods
• Contains extensive background material, shielding the reader from having to consult with a large number of primary references
• Homework/exam problems found at the end of each chapter

Contents:

Nov 2005   320pp   121 illustrations   106 exercises
0 521 81518 5 Hardback £48.00
This CD provides an interactive tool for teaching undergraduate fluid mechanics. It includes experiments that demonstrate fluid mechanical phenomena, animations of important principles and concepts, virtual laboratories in which students acquire data from the images, interactive computational exercises in which parameters may be varied, and other descriptive and illuminating material on applications. The content may be accessed randomly through a hyperlinked text, a search engine, a video library, and a glossary of terms. Thanks to developments in technology this new release includes versions in English, Spanish and French.

‘Homsy and his colleagues have now provided us with a new and powerful teaching aid … This CD is an ambitious project, and, in my view, it has been accomplished with remarkable success … I have no doubt that this CD-ROM should be regarded as a ‘set text’ for viscous fluid mechanics courses at the undergraduate or starting graduate levels.’

JOURNAL OF FLUID MECHANICS

2004
0 521 60476 1 CD-ROM £15.99 + vat

Multimedia Fluid Mechanics – Multilingual Version
G. M. Homsy
University of California, Santa Barbara, USA
H. Aref
Virginia Polytechnic Institute, USA
K. S. Breuer
Brown University, Rhode Island, USA
S. Hochgreb
University of Cambridge, UK
J. R. Koseff
Stanford University, USA
B. R. Munson
Iowa State University, USA
K. G. Powell
Michigan State University, USA
C. R. Robertson
Stanford University, USA
S. T. Thoroddsen
National University of Singapore

This CD provides an interactive tool for teaching undergraduate fluid mechanics. It includes experiments that demonstrate fluid mechanical phenomena, animations of important principles and concepts, virtual laboratories in which students acquire data from the images, interactive computational exercises in which parameters may be varied, and other descriptive and illuminating material on applications. The content may be accessed randomly through a hyperlinked text, a search engine, a video library, and a glossary of terms. Thanks to developments in technology this new release includes versions in English, Spanish and French.

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JOURNAL OF FLUID MECHANICS

2004
0 521 60476 1 CD-ROM £15.99 + vat

Introduction to Computational Fluid Dynamics
Anil W. Date
Indian Institute of Technology, Bombay, India

Presenting a textbook for advanced undergraduate and first year graduate students in mechanical, aerospace and chemical engineering. The book emphasizes understanding CFD through physical principles and examples. The author follows a consistent philosophy of control volume formulation of the fundamental laws of fluid motion and energy transfer, and introduces a novel notion of ‘smoothing pressure correction’ for solution of flow equations on collocated grids within the framework of the well-known SIMPLE algorithm. Practising engineers will find this particularly useful for reference and for continuing education.

Features
• Single method for wide variety of problems.
• Treatment based on physical principles in which mathematics are employed to serve the requirements of physics
• Over 50 solved problems, over 130 practice problems, provision of user friendly computer programs in appendices, and a solutions manual

Contents: Preface; Nomenclature; 1. Introduction; 2. 1D heat conduction; 3. 1D conduction-convection; 4. 2D boundary layers; 5. 2D convection – Cartesian grids; 6. 2D convection - complex domains; 7. Phase change; 8. Numerical grid generation; 9. Convergence enhancement; Appendix A. Derivation of transport equations; Appendix B. 1D Conduction code; Appendix C. 2D Cartesian code.

Nov 2005 480pp 166 illustrations 126 exercises
0 521 85326 5 Hardback £35.00

A Gallery of Fluid Motion
M. Samimy
Ohio State University, USA
K. S. Breuer
Brown University, Rhode Island, USA
L. G. Leal
University of California, Santa Barbara
and P. H. Steen
Cornell University, New York, USA

The visualization of fluid flow has played a major role in the development of fluid dynamics and its applications, from the evolution of flight to the tracking of weather to understanding the flow of blood. The Division of Fluid Dynamics of the American Physical Society annually sponsors a competition for outstanding images of fluid flow. This is a selection of the winners since 1985. Each image comes with some explanatory text, making the Gallery an attractive and essential work for everyone interested in the art and science of fluid flow.

Features
• Unique collection of prize-winning images
• Plenty of colour images throughout the text
• Supplementary text provides explanatory background


2004 128pp 167 illustrations
0 521 53500 X Paperback £19.99
0 521 82773 6 Hardback £65.00
Prediction of Turbulent Flows
Edited by Geoff Hewitt and Christos Vassilicos
Both from the Imperial College of Science, Technology and Medicine, London, UK

This volume arose from a major programme held at the Isaac Newton Institute in Cambridge. It takes an overview of the current situation on the prediction of such flows through the use of modern computational fluid dynamics techniques. Current approximation methods are reviewed, and their applicability to various industrial problems discussed, providing guidelines for the choice of model for a given problem. This major work addresses the needs of experienced practitioners and researchers.

Features
• Contributions from top CFD researchers and practitioners
• Addresses the current needs of the expert CFD community
• Contains lots of illustrative material including colour figures

Contents:

June 2005 348pp 148 illustrations 0 521 83899 1 Hardback £95.00

Mathematical Modeling in Continuum Mechanics
2nd edition
Roger M. Temam
Indiana University, Bloomington, USA and Alain Michael Miranville
Université de Poitiers, France

This second edition will be a unique resource for those studying continuum mechanics at the advanced undergraduate and beginning graduate level whether in engineering, mathematics, physics or the applied sciences. Exercises and hints for solutions have been added to the majority of chapters, and the final part on solid mechanics has been substantially expanded. These additions have now made it appropriate for use as a textbook, but it also remains an ideal reference book for students and anyone interested in continuum mechanics.

Contents:

May 2005 626pp 114 illustrations 81 exercises 0 521 52541 1 Paperback £28.00

Hydrodynamic Stability
2nd edition
P. G. Drazin and W. H. Reid
University of Chicago, USA

Hydrodynamic stability is of fundamental importance in fluid dynamics and is concerned with the transition from laminar to turbulent flow. The emphasis throughout is on the ideas involved, the physical mechanisms, the methods used, and the results obtained, and, wherever possible, the theory is related to both experimental and numerical results. This new edition of this celebrated introduction differs principally by the inclusion of detailed solutions for the exercises, and by the addition of a Foreword by Professor J. W. Miles.

‘The work is undeniably of high scholarship, consummate accuracy and penetrating insight … All specialists in stability theory will be happy that two such authorities have found the time, and spared so few pains, to produce a work of such excellence.’

Contents:

2004 626pp 114 illustrations 81 exercises 0 521 52541 1 Paperback £26.00
Theory and Computation of Hydrodynamic Stability

W. O. Criminale
University of Washington, USA

T. L. Jackson
University of Illinois, Urbana-Champaign, USA

and R. D. Joslin
Office of Naval Research, Arlington, USA

This treatise covers both classical and modern aspects of the fundamental topic of hydrodynamic stability, considering linear and nonlinear situations, and analysing temporal and spatial aspects. The authors examine each problem both analytically and numerically: every chapter ends with an appendix outlining full direct numerical simulation (DNS) computer code. The text is enriched with many exercises, copious illustrations and an extensive bibliography. The result is a book that can be used with courses on hydrodynamic stability or as an authoritative reference for researchers.

‘… overall I am very impressed with this text. It provides a comprehensive account of modern stability theory … I have no doubt that in time it will be acknowledged as a valuable resource to both graduate students and established researchers alike.’

GEOPHYSICAL AND ASTROPHYSICAL FLUID DYNAMICS


2003 464pp 144 illustrations 60 exercises
0 521 63200 5 Hardback £60.00

Liquid Sloshing Dynamics

Theory and Applications
Raouf A. Ibrahim
Wayne State University, Michigan, USA

The problem of liquid sloshing in moving or stationary containers remains of great concern to aerospace, civil, and nuclear engineers, physicists, designers of road tankers and ship tankers, and mathematicians. Beginning with the fundamentals of liquid sloshing theory, this book takes the reader systematically from basic theory to advanced analytical and experimental results in a self-contained and coherent format. It presents liquid sloshing effects on space vehicles, storage tanks, road vehicle tanks and ships and elevated water towers under ground motion.

Features
- Deals with almost every aspect of liquid sloshing dynamics
- Presents liquid sloshing effects on space vehicles, storage tanks, road vehicle tanks and ships and elevated water towers under ground motion
- Cites over 2,600 references


May 2005 970pp 376 illustrations
0 521 83885 1 Hardback £160.00

Suspension Acoustics

An Introduction to the Physics of Suspensions
Samuel Temkin
Rutgers University, New Jersey, USA

Examines, from a fundamental point of view, the response of single particles in fluids and uses the results of such a detailed examination to consider suspension motions as a whole, paying particular attention to acoustic motions, that is to the propagation of sound waves. Such propagation is examined from different perspectives in a unified manner that applies to several particle-fluid combinations. Among the possible applications of the theory presented, the book discusses the characterization of suspensions by acoustic means and the agglomeration of particles with sound waves.

Features
- This book is the first to use a unified approach to treat the subject
- Written by a leading expert in the field
- Book organization makes it suitable for use as an introduction to suspension physics


July 2005 432pp 156 illustrations
0 521 84757 5 Hardback £60.00
Gravity-Capillary Free Surface Flows
Jean-Marc Vanden-Broeck
University of East Anglia, UK

Gravity-capillary flows, in which the effects of pipe flow, gravity flow, and surface tension combine to produce a singular flow pattern, are utilised in many applications. The effect of surface tension on gravity-capillary flows continues to be a fertile research area in applied mathematics and engineering. Concentrating on applications arising from fluid dynamics, Professor Vanden-Broeck’s volume draws from his own results, collected from years of experience in the subject, and places this knowledge within the context of recent developments in this latest addition to the Cambridge Monographs in Mechanics series.

Features
• Major work highlighting recent developments in the field
• Well-respected author with years of research experience
• Develops understanding of structure of solutions gained from careful implementation of numerical techniques

Contents:
1. Introduction; 2. Free surface flows with interest walls; 3. Free surface flows with intersections with walls; 4. Time dependent free surface flows; 5. Three-dimensional free surface flows.

September 2005 300pp 0 521 81190 2 Hardback £50.00

Finite Difference Methods for Computational Fluid Dynamics
E. G. Puckett
University of California, Davis, USA
P. Colella
University of California, Berkeley, USA

Computational methods for fluid dynamics are now considered as a reliable alternative to experimental techniques. The book outlines the main solution methods and algorithms available to those working on both compressible and incompressible flow problems. Ideal as an upper-division textbook or as a reference for CFD researchers and professionals.

Features
• Upper-division textbook based on long-running lecture courses
• Addresses methods for both compressible and incompressible flow
• Suitable also as a reference text for existing CFD practitioners


October 2005 350 pp 263 illustrations 0 521 79208 8 Paperback £25.00
0 521 55500 0 Hardback £55.00

Closure Strategies for Turbulent and Transitional Flows
Edited by
B. E. Launder
University of Manchester Institute of Science and Technology, UK
and N. D. Sandham
University of Southampton, UK

Turbulence modelling is critically important for industries dealing with fluid flow and for applied mathematicians. This collection of lecture courses presented at a Newton Institute instructional conference on the title topic by leading researchers, has been edited or rewritten to provide a coherent account suitable for self-study.

‘... can be strongly recommended to graduate students and academic teachers as well as to the CFD practitioner who has the ambition to look, and perhaps to go, beyond the commercially available software.’

ZEITSCHRIFT FÜR ANGEWANDTE MATHEMATIK UND MECHANIK

2002 768pp 263 illustrations 0 521 79208 8 Hardback £100.00
**Internal Flow**

Concepts and Applications

E. M. Greitzer  
Massachusetts Institute of Technology, USA  
C. S. Tan  
Massachusetts Institute of Technology, USA  
and M. B. Graf  
Mars & Co, USA

This book describes the analysis and behavior of internal flows encountered in propulsion systems, fluid machinery (compressors, turbines, and pumps) and ducts (diffusers, nozzles and combustion chambers). The focus is on phenomena that are important in setting the performance of a broad range of fluid devices.

**Contents:**  

2004 736pp 480 illustrations  
0 521 34393 3 Hardback £70.00

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**Breakup of Liquid Sheets and Jets**

S. P. Lin  
Clarkson University, New York, USA

The theme of this book is an exposition of what we know about the physics underlying the onset of instability in liquid sheets and jets. Wave motion and breakup phenomena subsequent to the onset of instability are also carefully explained. Physical concepts are established through rigorous mathematics, accurate numerical analyses and comparison of theory with experiment.  

‘This text is written in a style making it easy to understand, and is presented at a reasonable pace, allowing the readers to first focus on the fundamentals before proceeding on to more complex systems.’  

THE CHEMICAL ENGINEER

**Contents:**  

2003 286pp 15 illustrations  
0 521 80694 1 Hardback £55.00

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**Computational Fluid Dynamics**

T. J. Chung  
University of Alabama, Huntsville, USA

Computational fluid dynamics (CFD) techniques are used to solve complex fluid flow problems. This book ranges from elementary concepts to state-of-the-art CFD. It begins with CFD preliminaries. Then chapters cover finite difference, finite element, and finite volume methods; structured and unstructured grids; adaptive methods; and parallel processing. Finally, practical applications to problems including turbulence, reacting flows, acoustics, radiative heat transfer, and multiphase flows are discussed.

**Contents:** Part I. Preliminaries; Part II. Finite Difference Methods; Part III. Finite Element Methods; Part IV. Automatic Grid Generation, Adaptive Methods and Computing Techniques; Part V. Applications.

2002 1036pp 349 line diagrams 28 tables  
0 521 59416 2 Hardback £80.00

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**Computational Models for Turbulent Reacting Flows**

Rodney O. Fox  
Iowa State University, USA

This book analyzes the strengths and weaknesses of the various techniques described throughout. The focus is on formulation of practical models as opposed to numerical issues arising from their solution. A theoretical framework based on the one-point, one-time joint probability density function (PDF) is developed. It is shown that all commonly employed models for turbulent reacting flows can be formulated in terms of the joint PDF of the chemical species and enthalpy. Models based on direct closures for the chemical source term as well as transported PDF methods are covered in detail. An introduction to the theory of turbulent and turbulent scalar transport is provided for completeness.

‘Fox has become a master of the material described in the book, and has made significant contributions to the subject. The writing is clear and authoritative, and contains ample historical and modern references. The book is attractively presented …’  

JOURNAL OF FLUID MECHANICS

2003 438pp 104 illustrations  
0 521 65907 8 Paperback £40.00

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**An Introduction to Turbulent Flow**

Jean Mathieu and Julian Scott  
Both from Ecole Centrale de Lyon, France

A solid grounding in the subject of turbulence, developing both physical insight and the mathematical framework needed to express the theory.

‘The character of a book is determined at least partly by the care with which the material is presented, and this one amply demonstrates the care that the authors have invested … the authors have succeeded in the task they set out to do, and I recommend the book to all students of turbulence, no matter what their persuasion.’  

PHYSICS TODAY

2000 384pp 81 illustrations  
0 521 77538 8 Paperback £35.00
Perspectives in Fluid Dynamics
A Collective Introduction to Current Research
Edited by G. K. Batchelor
H. K. Moffatt
and M. G. Worster
All from the University of Cambridge, UK
This wide-ranging text on modern fluid mechanics research includes sections on modelling the environment, physiology and magnetohydrodynamics. At the same time, the book discusses basic physical phenomena such as turbulence that still present fundamental challenges.
‘The book belongs on the shelf of any serious student of fluid mechanics and many researchers whose work touches on the subject of fluid mechanics in a substantial way.’
JOURNAL OF FLUID MECHANICS
Contents:
2002 644pp 227 illustrations 384 exercises
0 521 59886 9 Paperback £38.00

Turbulent Flows
Stephen B. Pope
Cornell University, New York, USA
Comprehensive and designed for teaching it is based on a course taught by the author at Cornell University for a number of years. Part I provides a general introduction to turbulent flows, how they behave, how they can be described quantitatively, and the fundamental physical processes involved. Part II is concerned with different approaches for modelling or simulating turbulent flows.
‘… the text can be classified as one of the pearls in the field.’
APPLIED MECHANICAL REVIEW
2000 806pp 279 illustrations 384 exercises
0 521 59886 9 Paperback £38.00

An Introduction to Fluid Dynamics
G. K. Batchelor
University of Cambridge, UK
First published in 1967, Professor Batchelor’s classic text on fluid dynamics is still one of the foremost texts in the subject. The careful presentation of the underlying theories of fluids is still timely and applicable.
‘This book gives an excellent introduction to fluid dynamics … many interesting and important photographs of fluid flows are included in order to help the students who do not have an opportunity of observing flow phenomena in a laboratory. The book also contains exercises at the end of each chapter. In comparison with many currently available books, I find this book by Batchelor especially stimulating and useful for students of applied mathematics and engineering.’
ZENTRALBLATT MATH
2000 635pp 172 illustrations
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Numerical Methods of Engineering with MATLAB
Jaan Kiusalaas
Pennsylvania State University, USA
A text for engineering students and a reference for practicing engineers. The numerous examples and applications were chosen for their relevance to real world problems, and where numerical solutions are most efficient. MATLAB® m-files accompany each method and are available on the book web site.
Features
• Only available MATLAB® based engineering numerical methods text
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Sept 2005 608 pp 145 illustrations 346 exercises
0 521 85288 9 Hardback £35.00
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0 521 85287 0

Hydrodynamics of High-Speed Marine Vehicles
Odd M. Faltinsen
Norwegian University of Science and Technology, Trondheim, Norway
Discusses how ocean waves and the water flow affect high-speed vessels and how this depends on the vessel type and forward speed. All aspects of marine hydrodynamics are covered with an emphasis on rational and simplified methods.
September 2005 600pp 175 illustrations
0 521 84568 8 Hardback £50.00
Marine Turbulence
Theories, Observations and Models
Results of the CARTUM Project
Edited by Helmut Z. Baumert, John Simpson and Jürgen Sundermann

The first book/CD-ROM to give a comprehensive overview of measurement techniques and theories for marine turbulence and mixing processes. Written by a team of 53 world experts, the book represents a rich source of data and methods for students, scientists, and engineers in oceanography, hydrology, limnology, and meteorology.

2005 652pp 107 illustrations
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*Introductory Offer price of £150.00 available until 3 months after publication

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