

1. Record Nr.	UNINA9910811989803321
Autore	Kundu Pijush K
Titolo	Fluid mechanics // Pijush K. Kundu, Ira M. Cohen ; with contributions by P.S. Ayyaswamy and H.H. Hu
Pubbl/distr/stampa	Amsterdam ; ; Boston, : Academic Press, c2008
ISBN	1-282-54038-6 9786612540387 0-08-055583-7
Edizione	[4th ed.]
Descrizione fisica	1 online resource (901 p.)
Altri autori (Persone)	CohenIra M
Disciplina	620.1/06
Soggetti	Fluid mechanics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Front Cover; Fluid Mechanics; Copyright Page; Dedication; About the Author; Table of Contents; Preface; Preface to Third Edition; Preface to Second Edition; Preface to First Edition; Author's Notes; Chapter 1. Introduction; 1. Fluid Mechanics; 2. Units of Measurement; 3. Solids, Liquids, and Gases; 4. Continuum Hypothesis; 5. Transport Phenomena; 6. Surface Tension; 7. Fluid Statics; 8. Classical Thermodynamics; 9. Perfect Gas; 10. Static Equilibrium of a Compressible Medium; Exercises; Literature Cited; Supplemental Reading; Chapter 2. Cartesian Tensors; 1. Scalars and Vectors 2. Rotation of Axes: Formal Definition of a Vector 3. Multiplication of Matrices; 4. Second-Order Tensor; 5. Contraction and Multiplication; 6. Force on a Surface; 7. Kronecker Delta and Alternating Tensor; 8. Dot Product; 9. Cross Product; 10. Operator $\nabla$ : Gradient, Divergence, and Curl; 11. Symmetric and Antisymmetric Tensors; 12. Eigenvalues and Eigenvectors of a Symmetric Tensor; 13. Gauss' Theorem; 14. Stokes' Theorem; 15. Comma Notation; 16. Boldface vs Indicical Notation; Exercises; Literature Cited; Supplemental Reading; Chapter 3. Kinematics; 1. Introduction 2. Lagrangian and Eulerian Specifications 3. Eulerian and Lagrangian Descriptions: The Particle Derivative; 4. Streamline, Path Line, and Streak Line; 5. Reference Frame and Streamline Pattern; 6. Linear Strain Rate; 7. Shear Strain Rate; 8. Vorticity and Circulation; 9. Relative

Motion near a Point: Principal Axes; 10. Kinematic Considerations of Parallel Shear Flows; 11. Kinematic Considerations of Vortex Flows; 12. One-, Two-, and Three-Dimensional Flows; 13. The Streamfunction; 14. Polar Coordinates; Exercises; Supplemental Reading; Chapter 4. Conservation Laws; 1. Introduction  
 2. Time Derivatives of Volume Integrals  
 3. Conservation of Mass; 4. Streamfunctions: Revisited and Generalized; 5. Origin of Forces in Fluid; 6. Stress at a Point; 7. Conservation of Momentum; 8. Momentum Principle for a Fixed Volume; 9. Angular Momentum Principle for a Fixed Volume; 10. Constitutive Equation for Newtonian Fluid; 11. Navier-Stokes Equation; 12. Rotating Frame; 13. Mechanical Energy Equation; 14. First Law of Thermodynamics: Thermal Energy Equation; 15. Second Law of Thermodynamics: Entropy Production; 16. Bernoulli Equation; 17. Applications of Bernoulli's Equation  
 18. Boussinesq Approximation  
 19. Boundary Conditions; Exercises; Literature Cited; Supplemental Reading; Chapter 5. Vorticity Dynamics; 1. Introduction; 2. Vortex Lines and Vortex Tubes; 3. Role of Viscosity in Rotational and Irrotational Vortices; 4. Kelvin's Circulation Theorem; 5. Vorticity Equation in a Nonrotating Frame; 6. Velocity Induced by a Vortex Filament: Law of Biot and Savart; 7. Vorticity Equation in a Rotating Frame; 8. Interaction of Vortices; 9. Vortex Sheet; Exercises; Literature Cited; Supplemental Reading; Chapter 6. Irrotational Flow  
 1. Relevance of Irrotational Flow Theory

---

Sommario/riassunto

Fluid mechanics, the study of how fluids behave and interact under various forces and in various applied situations-whether in the liquid or gaseous state or both-is introduced and comprehensively covered in this widely adopted text. Fully revised and updated with the addition of a new chapter on biofluid mechanics, Fluid Mechanics, Fourth Edition is suitable for both a first or second course in fluid mechanics at the graduate or advanced undergraduate level. The leading advanced general text on fluid mechanics, Fluid Mechanics, 4e guides students from the fundamentals to the an

---