<<涡量和不可压缩流>>

图书基本信息

书名:<<涡量和不可压缩流>>

13位ISBN编号: 9787506265539

10位ISBN编号:7506265532

出版时间:2003-9

出版时间:世界图书出版公司

作者: A.J.MajdaA.L.Bertozzi

页数:545

版权说明:本站所提供下载的PDF图书仅提供预览和简介,请支持正版图书。

更多资源请访问:http://www.tushu007.com

<<涡量和不可压缩流>>

内容概要

Vorticity is perhaps the most important facet of turbulent fluid flows. This book is intended to be a comprehensive introduction to the mathematical theory of vorticity and incompressible flow ranging from elementary introductory material to current research topics. Although the contents center on mathematical theory, many parts of the book showcase a modem applied mathematics interaction among rigorous mathematical theory, numerical, asymptotic, and qualitative simplified modeling, and physical phenomena. The interested reader can see many examples of this symbiotic interaction throughout the hook, especially in Chaps. 4-9 and 13. The authors hope that this point of view will be interesting to mathematicians as well as other scientists and engineers with interest in the mathematical theory of incompressible flows.

<<涡量和不可压缩流>>

书籍目录

Preface1 An Introduction to Vortex Dynamics for Incompressible Fluid Flows 1.1 The Euler and the Navier-Stokes Equations 1.2 Symmetry Groups for the Euler and the Navier-Stokes Equations 1.3 Particle Trajectories 1.4 The Vorticity, a Deformation Matrix, and Some Elementary Exact Solutions 1.5 Simple Exact Solutions with Convection, Vortex Stretching, and Diffusion 1.6 Some Remarkable Properties of the Vorticity in Ideal Fluid Flows 1.7 Conserved Quantities in Ideal and Viscous Fluid Flows 1.8 Leray''s Formulation of Incompressible Flows and Hodge's Decomposition of Vector Fields 1.9 Appendix Notes for Chapter 1 References for Chapter 12 The Vorfidty-Stream Formulation of the Euler and the Navier. Stokes Equations 2.1 The Vorticity-Stream Formulation for 2D Flows 2.2 A General Method for Constructing Exact Steady Solutions to the 2D Euler Equations 2.3 Some Special 3D Flows with Nontrivial Vortex Dynamics 2.4 The Vorticity-Stream Formulation for 3D Flows 2.5 Formulation of the Euler Equation as an Integrodifferential Equation for the Particle Trajectories Notes for Chapter 2 References for Chapter 23 Energy Methods for the Euler and the Navier-Stokes Equations 3.1 Energy Methods: Elementary Concepts 3.2 Local-in-Time Existence of Solutions by Means of Energy Methods 3.3 Accumulation of Vorticity and the Existence of Smooth Solutions Globally in Time 3.4 Viscous-Splitting Algorithms for the Navier-Stokes Equation 3.5 Appendix for Chapter 3 Notes for Chapter 3 References for Chapter 34 The Particle-Trajectory Method for Existence and Uniqueness of Solutions to the Euler Equation 4.1 The Local-in-Time Existence of Inviscid Solutions 4.2 Link between Global-in-Time Existence of Smooth Solutions and the Accumulation of Vorticity through Stretching 4.3 Global Existence of 3D Axisymmetric Flows without Swirl 4.4 Higher Regularity 4.5 Appendixes for Chapter 4 Notes for Chapter 4 References for Chapter 45 The Search for Singular Solutions to the 3D Euler Equations 5.1 The Interplay between Mathematical Theory and Numerical Computations in the Search for Singular Solutions 5.2 A Simple 1D Model for the 3D Vorticity Equation 5.3 A 2D Model for Potential Singularity Formation in 3D Euler Equations 5.4 Potential Singularities in 3D Axisymmetric Flows with Swirl 5.5 Do the 3D Euler Solutions Become Singular in Finite Times Notes for Chapter 5 References for Chapter 56 Computational Vortex Methods 6.1 The Random-Vortex Method for Viscous Strained Shear Layers 6.2 2D Inviscid Vortex Methods 6.3 3D Inviscid-Vortex Methods 6.4 Convergence of Inviscid-Vortex Methods 6.5 Computational Performance of the 2D Inviscid-Vortex Method on a Simple Model Problem 6.6 The Random-Vortex Method in Two Dimensions 6.7 Appendix for Chapter 6 Notes for Chapter 6 References for Chapter 67 Simplified Asymptotic Equations for Slender Vortex Filaments 7.1 The Self-Induction Approximation, Hasimoto''s Transform, and the Nonlinear Schrodinger Equation 7.2 Simplified Asymptotic Equations with Self-Stretch for a Single Vortex Filament 7.3 Interacting Parallel Vortex Filaments - Point Vortices in the Plane 7.4 Asymptotic Equations for the Interaction of Nearly Parallel Vortex Filaments 7.5 Mathematical and Applied Mathematical Problems Regarding Asymptotic Vortex Filaments Notes for Chapter 7 References for Chapter 78 Weak Solutions to the 2D Euler Equations with Initial Vorticity in L 8.1 Elliptical Vorticies 8.2 Weak L Solutions to the Vorticity Equation 8.3 Vortex Patches 8.4 Appendix for Chapter 8 Notes for Chapter 8 References for Chapter 89 Introduction to Vortex Sheets, Weak Solutions, and Approximate-Solution Sequences for the Euler Equation 9.1 Weak Formulation of the Euler Equation in Primitive-Variable Form 9.2 Classical Vortex Sheets and the Birkhoff-Rott Equation 9.3 The Kelvin-Helmholtz Instability 9.4 Computing Vortex Sheets 9.5 The Development of Oscillations and Concentrations Notes for Chapter 9 References for Chapter 910 Weak Solutions and Solution Sequences in Two Dimensions 10.1 Approximate-Solution Sequences for the Euler and the Navier-Stokes Equations 10.2 Convergence Results for 2D Sequences with L1 and Lp Vorticity Control Notes for Chapter 10 References for Chapter 1011 The 2D Euler Equation: Concentrations and Weak Solutions with Vortex-Sheet Initial Data 11.1 Weak-* and Reduced Defect Measures 11.2 Examples with Concentration 11.3 The Vorticity Maximal Function: Decay Rates and Strong Convergence 11.4 Existence of Weak Solutions with Vortex-Sheet Initial Data of Distinguished Sign Notes for Chapter 11 References for Chapter 1112 Reduced Hansdorff Dimension, Oscillations, and Measure-Valued Solutions of the Euler Equations in Two and Three Dimensions 12.1 The Reduced Hausdorff Dimension 12.2

<<涡量和不可压缩流>>

Oscillations for Approximate-Solution Sequences without L1 Vorticity Control 12.3 Young Measures and Measure-Valued Solutions of the Euler Equations 12.4 Measure-Valued Solutions with Oscillations and Concentrations Notes for Chapter 12 References for Chapter 1213 The Vlasov-Poisson Equations ns an Analogy to the Euler Equations for the Study of Weak Solutions 13.1 The Analogy between the 2D Euler Equations and the 1D Vlasov-Poisson Equations 13.2 The Single-Component 1D Vlasov-Poisson Equation 13.3 The Two-Component Vlasov-Poisson System Note for Chapter 13 References for Chapter 13 Index

<<涡量和不可压缩流>>

版权说明

本站所提供下载的PDF图书仅提供预览和简介,请支持正版图书。

更多资源请访问:http://www.tushu007.com