

1. Record Nr.	UNISA996472060803316
Autore	Huilgol R. R. <1939->
Titolo	Fluid mechanics of viscoplasticity / / Raja R. Huilgol and Georgios C. Georgiou
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2022] ©2022
ISBN	3-030-98503-2
Edizione	[Second edition.]
Descrizione fisica	1 online resource (405 pages)
Disciplina	531.382
Soggetti	Fluid mechanics Viscoplasticity Mechanics, Applied
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- Preface -- Acknowledgements -- Contents -- 1 The Basic Features of Viscoplasticity -- 1.1 Bingham Fluid at Rest in a Channel -- 1.2 Sign of the Shear Stress -- 1.3 Critical Pressure Drop and the Constitutive Relation -- 1.4 The Solution -- 1.5 Flow Rate -- 1.6 Inherent Nonlinearity -- 1.7 Non-dimensionalisation -- 1.8 The Buckingham Equation -- 1.9 Free Boundary Problems -- 1.10 The Minimiser and the Variational Inequality -- 1.11 Effects of Wall Slip -- 1.12 Experimental Evidence and Modelling -- References -- 2 Kinematics of Fluid Flow -- 2.1 Kinematical Preliminaries -- 2.2 Relation Between the Velocity and Deformation Gradients -- 2.3 Rigid Motion -- 2.4 Polar Decomposition, Spin and Stretching -- 2.5 Steady Velocity Fields and Their Rivlin-Ericksen Tensors -- 2.6 Appendix A: Divergence, Curl, Rivlin-Ericksen Tensor and Spin Tensor -- References -- 3 Fundamental Equations: Continuum Mechanics and Lattice Boltzmann Models -- 3.1 Introduction -- 3.2 Conservation of Mass -- 3.3 Cauchy's First Law of Motion -- 3.4 Cauchy's Second Law of Motion -- 3.5 Conservation of Energy -- 3.6 Control Volume and Control Surface -- 3.7 Particle Based Models -- 3.8 Evolution Equations for Particle Distribution Functions -- 3.9 Fluid-Velocity and Particle-Velocity Lattice Boltzmann Methods -- 3.10 Appendix A: Equations of Motion in Various Coordinates -- 3.11 Appendix B: Equilibrium Particle

Distribution Functions -- References -- 4 Constitutive Equations -- 4.1 Pressure and Incompressibility -- 4.2 Incompressible Viscoplastic Fluids -- 4.2.1 Equations of Motion for Incompressible Materials -- 4.3 Viscoplasticity Constraint Tensor -- 4.4 Regularisation -- 4.5 Compressible Viscoplastic Fluids -- 4.6 Constitutive Models for Incompressible Viscoplastic Fluids -- 4.6.1 One-Dimensional Models -- 4.6.2 Some Results from Tensor Analysis. 4.6.3 Three-Dimensional Models -- References -- 5 Analytic Solutions: Steady Flows -- 5.1 Introduction -- 5.2 Simple Shearing Flow -- 5.3 Flow in a Channel -- 5.4 Flow Down an Inclined Plane -- 5.5 Poiseuille Flow -- 5.5.1 The Velocity Field and the Flow Rate -- 5.5.2 The Buckingham Equation -- 5.6 Axial Flow in a Concentric Annulus -- 5.7 Couette Flow -- 5.7.1 Flow Due to Positive Shear Stress -- 5.7.2 Lambert W Function -- 5.7.3 Fully Sheared Flow -- 5.7.4 Flow Due to Negative Shear Stress -- 5.8 Axial Couette-Poiseuille Flow -- 5.8.1 Axial Couette Flow -- 5.8.2 Axial Couette-Poiseuille Flow -- 5.9 Helical Flow -- 5.10 Herschel-Bulkley and Casson Fluids: Shear Rate Formulation -- 5.10.1 Herschel-Bulkley Fluids -- 5.10.2 Casson Fluids -- 5.11 Herschel-Bulkley Fluids: Partial Flow Rate Function Method -- 5.12 Herschel-Bulkley Fluids: Antiplane Shear Flow -- 5.13 Lambert W Function and the Papanastasiou Model -- 5.14 Flows with Wall Slip -- 5.14.1 Simple Shearing Flow -- 5.14.2 Channel Flow -- 5.14.3 Axisymmetric Poiseuille Flow -- 5.14.4 Annular Poiseuille Flow -- 5.14.5 Circular Couette Flow of a Bingham Fluid -- 5.14.6 Torsional Parallel Flow -- 5.15 Flows of Materials with Pressure Dependent Rheological Parameters -- 5.15.1 Channel Flow of a Bingham Fluid -- 5.15.2 Axisymmetric Poiseuille Flow of a Bingham Fluid -- 5.16 Heat Transfer Problems -- 5.16.1 Heat Transfer Between Parallel Plates -- 5.16.2 More General Problems -- References -- 6 Unsteady Shearing Flows -- 6.1 Unsteady Flow in a Channel -- 6.1.1 The Solution -- 6.1.2 Approximate Solution -- 6.2 A Numerical Solution to the Velocity Field -- 6.2.1 Approximate Evaluation -- 6.2.2 Numerical Comparison -- 6.3 Laplace Transform -- 6.4 Application of Maximum Principles -- 6.5 Unsteady Couette and Poiseuille Flows -- 6.6 Unsteady Flow in a Half-Space -- 6.6.1 An Initial Value Problem. 6.6.2 Singular Surfaces in Motion -- 6.6.3 Hadamard Lemma and Unsteady Shearing Flows in Viscoplastic Fluids -- 6.6.4 Implications of the Continuity of $\dot{\gamma}$ at the Yield Surface -- 6.6.5 Extensions to Other Shearing Flows -- 6.6.6 Open-Ended Problems -- References -- 7 Analytical Approximation Techniques -- 7.1 The Lubrication Paradox -- 7.2 Steady Flow in a Wavy Channel-The Periodic Case -- 7.2.1 The Zeroth Order Solution -- 7.2.2 First Order Corrections -- 7.2.3 Breaking the Unyielded Plug -- 7.3 Circumventing the Lubrication Paradox -- 7.3.1 Flow of a Herschel-Bulkley Fluid in a Symmetric Channel -- 7.3.2 The Zeroth Order Solution -- 7.3.3 Flow in a Channel of Linearly Varying Width -- 7.3.4 Viscoplastic Flows in Axisymmetric Tubes -- 7.4 Slump Tests -- 7.4.1 The Fifty Cent Rheometer -- 7.4.2 Asymptotic Formulae for Cylinders of Large and Small Heights -- 7.4.3 Height of the Incipient Failure of a Circular Cylinder -- 7.4.4 The Dam Break and the Bostwick Consistometer -- 7.4.5 The Twin-Fluid Model -- 7.5 Hele-Shaw Flow Problems -- 7.5.1 The Symmetric Case -- 7.5.2 The Average Velocity Field in the Symmetric Case -- 7.5.3 Hele-Shaw Flow Equations -- 7.5.4 The Asymmetric Case -- 7.6 Linearised Stability Analysis -- References -- 8 Variational Principles and Variational Inequalities -- 8.1 Minimum and Maximum Principles for Incompressible Viscoplastic Fluids -- 8.1.1 Basic Definitions and Principle of Virtual Power -- 8.1.2 The Velocity and Stress Functionals -- 8.1.3 Proofs of the Theorems -- 8.1.4 Equality of (u) and (T) --

8.1.5 Shear Rate Dependent Yield Stress -- 8.1.6 Steady Flow in a Pipe of Uniform Cross-Section -- 8.2 Virtual Power and the Basic Inequality for Incompressible Viscoplastic Fluids -- 8.2.1 A Point-Wise Inequality: Isochoric Velocity Fields -- 8.2.2 The Integral Inequality. 8.3 A General Energy Balance Equation for Viscoplastic Fluids -- 8.4 Fundamental Inequality: Non-isochoric Trial Velocity Fields -- 8.5 Variational Principles and Fundamental Inequality in the Presence of Wall Slip -- 8.6 Convex Analysis and Its Applications -- 8.6.1 The Direct Method -- 8.6.2 Convex Sets and Convex Functionals -- 8.6.3 Existence and Uniqueness -- 8.6.4 Variational Inequality -- 8.6.5 Equivalence of the Minimiser and the Solution of the Variational Inequality -- 8.7 Equivalence of the Solutions of the Variational Inequality ... -- 8.8 Special Cases of the Variational Inequality -- 8.8.1 Flows with Zero Stress Power Difference -- 8.8.2 Flows with Non-zero Stress Power Difference -- 8.8.3 The Trilinear Functional Involving Acceleration Terms -- 8.9 Viscoplasticity Constraint Tensor: The Final Equivalence -- 8.10 The Basic Inequality for Compressible Viscoplastic Fluids -- References -- 9 Energy Methods in Action: Equality, Inequality and Stability -- 9.1 Axial Flow in a Pipe of Arbitrary Cross-Section -- 9.1.1 The Minimum Pressure Drop per Unit Length to Initiate a Steady Flow -- 9.1.2 Existence of Stagnant Zones -- 9.1.3 Bounds on the Magnitude of the Core and Its Maximum Velocity -- 9.2 Static Bubbles in Viscoplastic Fluids -- 9.2.1 Critical Value of the Bingham Number to Prevent Bubble Motion -- 9.2.2 Critical Value from Stress Maximisation -- 9.2.3 A Condition for a Bubble to Move: An Upper Bound for the Bingham Number -- 9.3 Motions of Rigid Bodies in Viscoplastic Fluids -- 9.3.1 Motion in an Unbounded Domain -- 9.3.2 Settling in Bounded Domains and Cheeger Sets -- 9.4 Initiation and Cessation of Shearing Flows -- 9.4.1 The Approach to the Steady State -- 9.4.2 The Proof of the Energy Inequality -- 9.4.3 Cessation of the Steady Flow in a Channel -- 9.4.4 Cessation of Steady Simple Shear Flow. 9.4.5 Cessation of Steady Flow in a Pipe -- 9.4.6 Cessation of Steady Couette Flow -- 9.4.7 Effects of Wall Slip -- 9.5 Nonlinear Stability Analysis -- 9.5.1 Dissipation Terms -- 9.5.2 Global Stability Bounds -- 9.5.3 Conditional Stability -- References -- 10 Numerical Modelling -- 10.1 Augmented Lagrangian Methods: Finite Dimensional Case -- 10.2 Augmented Lagrangian Methods for Bingham Fluids -- 10.2.1 Optimality Conditions of the Augmented Lagrangian Functional -- 10.2.2 More General Problems -- 10.3 Operator-Splitting Method for Thermally Driven Flows -- 10.3.1 The Flow Problem and Mathematical Formulation -- 10.3.2 Non-dimensionalisation -- 10.3.3 Numerical Procedure -- 10.3.4 Discussion of the Results -- 10.4 Compressibility Effects: Numerical Experiments -- 10.4.1 Operator-Splitting Methods: Compressible Viscous Fluids -- 10.4.2 Compressible Viscoplastic Fluids: Isothermal Case -- 10.4.3 Operator-Splitting Method -- 10.5 Flow in a Cavity: Weakly Compressible Fluid -- 10.6 Shooting Method for the Flow in an Annulus -- 10.6.1 Helical Flows -- 10.7 Flow in Pipes of Square and Circular Cross-Sections -- 10.7.1 Theoretical Formulation -- 10.7.2 The Numerical Method -- 10.7.3 Boundary Conditions and Non-dimensional Variables -- 10.7.4 The Algorithm -- 10.7.5 The Lattice Speed -- 10.7.6 Results and Discussion -- 10.7.7 Flow in a Pipe of Circular Cross-Section -- 10.8 Thermally Influenced Lid-Driven Flow in a Square Cavity -- 10.8.1 Dimensional Equations -- 10.8.2 Non-dimensional Equations -- 10.8.3 The Continuity and Momentum Equations -- 10.8.4 The Energy Equation -- 10.8.5 Non-dimensional Variables -- 10.8.6 The Algorithm -- 10.8.7 Code Validation and Grid Independence -- 10.8.8 Results and Discussion -- References -- Index.

Sommario/riassunto	This book considers the kinematics and dynamics of the flows of fluids exhibiting a yield stress. Continuum mechanics governing the fluid mechanics is described. Two chapters are dedicated to analytical solutions to several steady and unsteady flows of viscoplastic fluids, including flows with pressure-dependent rheological parameters. Perturbation methods, variational inequalities to solve fluid flow problems, and the use of energy methods are discussed.
--------------------	---

2. Record Nr.	UNIORUON00013579
Titolo	L'Information géographique
Pubbl/distr/stampa	Paris, : J.-B. Baillière et fils, [1936]-
ISSN	0020-0093
Descrizione fisica	v. ; 27 cm
Classificazione	FR ABBONAMENTI GEOGRAFIA periodici annullati
Soggetti	GEOGRAFIA - Periodici
Lingua di pubblicazione	Francese
Formato	Materiale a stampa
Livello bibliografico	Periodico
Note generali	Bimestrale; poi trimestrale. - Dal 2001 cambia editore: A. Colin.