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Nota di contenuto

RHEOMETRY OF PASTES, SUSPENSIONS, AND GRANULAR MATERIALS; CONTENTS; PREFACE; NOTATION; INTRODUCTION; 1 MATERIAL MECHANICS; 1.1 Introduction; 1.2 Continuum Mechanics; 1.2.1 Definition of a Material; 1.2.2 Continuum Assumption; 1.2.3 Main Variables; 1.2.4 Conservation Laws; 1.3 Constitutive Equation; 1.3.1 Physical Origin; 1.3.2 General Characteristics; 1.3.3 Effect of Change in Frame of Observation; 1.3.4 Solids and Fluids; 1.3.5 Simple Shear and Viscometric Flows; 1.4 Viscometric Flows; 1.4.1 Free Surface Flow over a Plane; 1.4.2 Flow between Parallel Disks
1.4.3 Flow between a Cone and a Plate 1.4.4 Flow between Two Coaxial Cylinders; 1.4.5 Flow in a Cylindrical Conduit (Poiseuille Flow); References; 2 RHEOPHYSICS OF PASTES AND GRANULAR MATERIALS; 2.1 Interactions between Material Elements; 2.1.1 Hydrodynamic Interactions; 2.1.2 Colloidal Interactions; 2.1.3 Interactions between Bubbles or Droplets; 2.1.4 Interactions between Two Solid Particles; 2.1.5 Classification of Forces; 2.2 Rheology of Soft Jammed Systems (Pastes); 2.2.1 Solid Regime: Viscoelasticity; 2.2.2 Solid-Liquid Transition: Yielding; 2.2.3 Liquid Regime: Flow
2.2.4 Time Effects: Thixotropy 2.2.5 Synthesis; 2.3 Rheology of Granular Materials; 2.3.1 Frictional Regime; 2.3.2 Collisional Regime; 2.3.3 Frictional-Collisional Regime Transition; 2.4 Rheology of Granular Pastes; 2.4.1 Frictional Regime; 2.4.2 Lubricational Regime; 2.4.3 Frictional-Lubricational Regime Transition; References; 3 EXPERIMENTAL PROCEDURES AND PROBLEMS IN PASTE VISCOMETRY; 3.1 Experimental Procedures; 3.1.1 Setup of the Material; 3.1.2 Viscoelasticity in the Solid Regime; 3.1.3 Yielding: Solid-Liquid Transition; 3.1.4 Flow Curve; 3.1.5 Thixotropy
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3.4.2 Surface Tension for Non-Newtonian Liquids 3.5 Drying; 3.5.1 Evaporation; 3.5.2 Drying Regimes; 3.5.3 Drying Rates during Rheometrical Tests; 3.5.4 Effect of Drying on Rheometry; 3.5.5 Countermeasures; 3.6 Phase Separation; 3.6.1 Sedimentation; 3.6.2 Migration; 3.6.3 Segregation; 3.6.4 Consequences in Rheometry; 3.7 Cracking; 3.8 Temperature Effects; 3.9 Inertia Effects and Turbulence; 3.9.1 "Macroscopic" Inertia Effects; 3.9.2 Turbulence; References; 4 LOCAL RHEOMETRY; 4.1 Techniques for Measuring the Velocity Field in Fluids; 4.1.1 Principles of NMR; 4.1.2 Principles of MRI
4.1.3 Principles of MRI Velocimetry

Sommario/riassunto

A comprehensive examination of rheometry theory and its practical applications. This publication enables readers to understand and characterize the flow properties of complex fluids and, with this knowledge, develop a wide range of industrial and consumer products. The author fills a gap in the current literature by presenting a comprehensive description of the rheological behavior of pastes, suspensions, and granular materials and by offering readers the rheometrical techniques needed to effectively characterize these materials. With his extensive experience in both academic and