

1. Record Nr.	UNINA9910464935003321
Autore	Andreotti B.
Titolo	Granular media : between fluid and solid // Bruno Andreotti, Yoel Forterre, Olivier Pouliquen [[electronic resource]]
Pubbl/distr/stampa	Cambridge : , : Cambridge University Press, , 2013
ISBN	1-316-09073-6 1-107-25041-2 1-107-25124-9 1-139-54100-5 1-107-24792-6 1-107-24875-2 1-107-24958-9 1-107-03479-5
Descrizione fisica	1 online resource (viii, 462 pages) : digital, PDF file(s)
Disciplina	620/.43
Soggetti	Granular materials - Fluid dynamics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Title from publisher's bibliographic system (viewed on 05 Oct 2015).
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	<p>""Contents""; ""Foreword""; ""1 Introduction""; ""1.1 Definition and examples of granular media""; ""1.2 Between solid and liquid: what makes granular matter so difficult to describe?""; ""1.3 A sketch of the book""; ""2 Interactions at the grain level""; ""2.1 Solid contact forces""; ""2.1.1 Elastic contact: the Hertz law""; ""2.1.2 Solid friction""; ""2.1.3 Collision between two particles""; ""2.2 Cohesion forces""; ""2.2.1 Electrostatic effects""; ""2.2.2 Adhesion""; ""2.2.3 Capillary cohesion""; ""2.2.4 Real surfaces and the role of rugosity""; ""2.2.5 Solid bridges""; ""2.3 Forces in a flow""; ""2.3.1 The force on a grain in a uniform and steady flow""; ""2.3.2 Force in unsteady and inhomogeneous flows""; ""2.3.3 Hydrodynamic forces between grains: lubrication""; ""3 The granular solid: statics and elasticity""; ""3.1 Granular packings""; ""3.1.1 Volume fraction ""; ""3.1.2 Monodisperse packings of spheres ""; ""3.1.3 Packings of spheres of different sizes""; ""3.1.4 Compaction ""; ""3.2 Forces in a granular packing""; ""3.2.1 The role of friction and isostaticity""; ""3.2.2 Force distribution""; ""3.3 From forces to stresses""</p>

""3.3.1 Definition of stresses in a granular medium""""3.4 Stress distribution in static configurations""; ""3.4.1 Stress distribution in a silo: Janssen's model""; ""3.4.2 Stresses under a sand pile""; ""3.5 Elasticity""; ""3.5.1 Elasticity of a one-dimensional chain of beads""; ""3.5.2 Elastic moduli of a granular packing""; ""3.5.3 The constitutive relation""; ""3.5.4 Acoustics in granular media ""; ""4 The granular solid: plasticity""; ""4.1 Phenomenology""; ""4.1.1 The sand pile""; ""4.1.2 The shear cell""; ""4.1.3 The triaxial test""
""4.2 The different levels of description: a scalar approach""""4.2.1 The first level of description: a frictional medium""; ""4.2.2 The second level of description: taking into account variations in the volume fraction""; ""4.2.3 Towards more refined descriptions""; ""4.3 The Mohr-Coulomb model""; ""4.3.1 The yield criterion""; ""4.3.2 Applications of the Mohr-Coulomb criterion""; ""4.3.3 Generalization in three dimensions: the yield surface""; ""4.3.4 Plastic deformations""; ""4.3.5 Conclusions about the Mohr-Coulomb/Drucker-Prager model""
""4.4 The role of the volume fraction: critical-state theory""""4.4.1 The Drucker-Prager model with dilatancy""; ""4.4.2 The Cam-clay model""; ""4.5 Towards a more refined description of the plasticity""; ""4.5.1 Taking into account elasticity""; ""4.5.2 Towards more complex loading paths""; ""4.5.3 Localization phenomena""; ""4.5.4 Towards granular flows""; ""4.6 Plasticity of cohesive materials""; ""4.6.1 The phenomenology of cohesive granular media""; ""4.6.2 The cohesive Mohr-Coulomb model""; ""4.6.3 The relation between macroscopic and microscopic cohesion""; ""5 Granular gases""
""5.1 Analogies and differences with a molecular gas""

Sommario/riassunto

Sand, rice, sugar, snow, cement... Although ubiquitous in our daily lives, granular media still challenge engineers and fascinate researchers. This book provides the state-of-the-art of the physics of granular media and recent advances in the field. The book presents the fundamental properties of granular materials: interactions between grains; solid, liquid and gaseous behaviours; coupling with a fluid; and sediment transport and formation of geological structures. Descriptions of the phenomena combine qualitative and formal arguments, coming from areas as diverse as elasticity, plasticity, statistical physics, fluid mechanics and geomorphology. Many examples of the astonishing behaviours of granular media are presented, including avalanches, segregation, dune song and quicksand. This book is ideal for graduate students and researchers in physics, applied mathematics and engineering.
