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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"" ""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 variationsin 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.