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| Nota di contenuto | Foreword; Preface; Contents; 1. Introduction; 1.1 The significance of wet granular matter; 1.2 Energy scales; 1.3 Typical questions to be asked; 1.4 How we shall proceed; 2. Grains and Granular Fluids; 2.1 Grains; 2.1.1 Kinetic theory; 2.1.2 Dissipative collisions; 2.1.3 Grain shape; 2.1.4 Grain size; 2.1.5 Some phenomenological aspects of dry granulates; 2.2 Granular fluids; 2.2.1 Buoyant clouds; 2.2.2 Filling an earthquake fissure; 2.2.3 Granular flow with gaseous carrier; 2.2.4 Granular flow with liquid carrier; 2.2.5 Dilatancy; 2.3 Conclusions; Further reading; 3. Wetting<br>3.1 Planar substrates3.1.1 Van der Waals forces; 3.1.2 Adsorption isotherms; 3.1.3 The contact angle; 3.1.4 The effective interface potential; 3.1.5 The interface displacement model; 3.1.6 Curved interfaces and the Laplace pressure; 3.1.7 The contact angle away from coexistence; 3.2 Rough substrates; 3.2.1 Presentation of the problem; 3.2.2 Descriptors for roughness; 3.2.3 The wetting phase diagram; 3.2.4 Adsorption isotherms on a rough substrate; 3.2.5 Contact angle hysteresis; 3.3 Conclusions; Further reading; 4. Capillary Forces; 4.1 Capillary bridge between at walls<br>4.1.1 Extremal surfaces4.1.2 Attractive force of a toroidal bridge; 4.2 |

Capillary bridge between spherical bodies; 4.2.1 Formation of the capillary bridge; 4.2.2 Capillary bridge force; 4.2.3 The interaction potential between wet grains; 4.2.4 The hysteretic nature of the capillary bridge force; 4.3 Capillary bridge between irregular grains; 4.3.1 Effects of grain shape; 4.3.2 Effects of grain surface roughness; 4.3.3 Small scale capillary bridges; 4.4 Force networks; 4.4.1 Frustrated wet force networks; 4.4.2 Self-assembled granular walkers: ratcheting; 4.5 Conclusions; Further reading
5. Wet Granular Gases5.1 Dynamical aspects of capillary bridges; 5.1.1 Short time dynamics of a capillary bridge; 5.1.2 The effective restitution coefficient; 5.2 Free cooling and clustering; 5.2.1 Granular temperature during free cooling; 5.2.2 Morphology of the emerging clusters; 5.2.3 A formal distinction between dry and wet cooling; 5.3 Liquid-gas coexistence; 5.3.1 Equation of state of wet granular gases; 5.3.2 Experimental verification of the critical point; 5.3.3 Non-equilibrium phase separation; 5.3.4 Universal aspects of the phase diagram
5.3.5 The interplay of dissipation mechanisms5.3.6 Interfaces and interfacial tensions; 5.3.7 Binodals and spinodals, wet and dry; 5.4 Collective phenomena far from thermal equilibrium; 5.4.1 Surface tension revisited; 5.4.2 Chaoticity of the wet granular gas; 5.4.3 Capillary bridges as active networks; 5.5 Conclusions; Further reading; 6. Wet Granular Piles; 6.1 Geometrical aspects of granular piles; 6.1.1 Random piles of equal spheres; 6.1.2 Effects of grain size: poly-dispersity; 6.1.3 Effects of grain shape; 6.2 Regimes of wetness; 6.2.1 The humidity regime; 6.2.2 The pendular regime
6.2.3 The funicular regime

Sommario/riassunto

This is a monograph written for the young and advanced researcher entering the field of wet granular matter, and is keen to understand the basic physical principles governing this state of soft matter. It treats wet granulates as an instance of a ternary system, consisting of the grains, a primary, and a secondary fluid. After addressing wetting phenomena in general and outlining the basic facts on dry granular systems, a chapter on basic mechanisms and their effects is dedicated to every region of the ternary phase diagram. Effects of grain shape and roughness are considered as well. Rather t