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4.2.1 Metal slab in vacuum; 4.2.2 Semiconductor slab in vacuum; 4.2.3 Vacuum gap in a metal; 4.2.4 Vacuum gap in a semiconductor; 4.3 The Casimir effect; 4.3.1 Casimir effect at zero temperature; 4.3.2 Casimir effect at finite temperature; 4.4 Metal surfaces; 4.4.1 Surface energy of metals; 4.4.2 Optical properties of mercury; 4.4.3 Surface tension of mercury; 4.5 Quantum wells; 4.5.1 Casimir and van der Waals forces between two 2D metallic sheets; 4.5.2 Plasmon-pole approximation; 5 Forces; 5.1 Two molecules with permanent dipole moments; 5.2 One ion and one molecule with permanent dipole moment; 5.3 Two molecules one with and one without permanent dipole moment; 5.4 Two molecules without permanent dipole moments; 5.5 Two ions; 5.6 Three or more polarizable atoms; 5.7 Interaction between macroscopic objects; 5.8 Interaction between two spheres: limiting results; 5.9 Interaction between two spheres: general results; 5.9.1 Radially varying dielectric functions; 5.10 General expression for small separations; 5.11 Cylinders and half-spaces; 5.12 Summation of pair interactions; 5.13 Derivation of the van der Waals equation of state; 6 Energy and force; 6.1 Interaction energy at zero temperature; 6.1.1 Interaction between two polarizable atoms revisited: no retardation; 6.1.2 Interaction between two polarizable atoms revisited: retardation; 6.2 Interaction energy at finite temperature; 6.3 Surface energy, method 1: no retardation; 6.4 Surface energy, method 1: retardation; 6.5 Surface energy, method 2: no retardation; 6.6 Surface energy, method 2: retardation; 6.7 Finite temperatures; 6.7.1 Retarded interaction energy; 6.8 Recent results for metals; 6.9 Adhesion, cohesion, and wetting; 6.9.1 Work of adhesion and cohesion; 6.9.2 Wetting

Sommario/riassunto

Electromagnetic surface modes are present at all surfaces and interfaces between material of different dielectric properties. These modes have very important effects on numerous physical quantities: adhesion, capillary force, step formation and crystal growth, the Casimir effect etc. They cause surface tension and wetting and they give rise to forces which are important e.g. for the stability of colloids. This book is a useful and elegant approach to the topic, showing how the concept of electromagnetic modes can be developed as a unifying theme for a range of condensed matter physics. The
