



OPTICAL PROPERTIES OF SURFACES



by **Dick Bedeaux & Jan Vlieghe**

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This invaluable book represents a substantial body of work describing the theory of the optical properties of thin island films and rough surfaces. In both cases the feature sizes are small compared to the wavelength of light. The approach is extremely rigorous and theoretically very thorough.

The reflection, transmission and absorption of light are described. Computer programs that provide exact solutions for theoretical properties of thin island films have recently become available, and this makes the book of great practical use.

The early chapters provide a comprehensive theoretical framework. The electromagnetic properties of a boundary layer are described in terms of excess of the electric current, charge density and electric and magnetic fields, in Chapters 2 and 3. The reflection, transmission and absorption of light are described in Chapter 4. Chapters 5 to 10 present a spectrum of specific island films. Spheres and spheroids with the axis of revolution normal to the substrate are treated. The region of contact is finite in both cases and the bottom of the island planar. Both the low coverage limit and finite coverage are discussed. In all cases the electromagnetic interaction with the image charge distribution in the substrate is taken into account rigorously. In Chapter 11 the theory is applied to stratified layers, reproducing well-known results in a simple and straightforward manner. The Green functions for the general solution of the wave equation are given in Chapter 12 and used in Chapter 13 in the derivation of the symmetry relations. The last chapter deals with rough surfaces.

C o n t e n t s :

Excess Currents, Charge Densities and Fields; Maxwell's Equations with Singular Fields; Reflection and Transmission; Island Films in the Low Coverage Limit; Spheroidal Island Films in the Low Coverage Limit; Islands Films for a Finite Coverage; Films of Truncated Spheres for a Low Coverage; Films of Truncated Spheroids in the Low Coverage Limit; Films of Truncated Spheres or Spheroids for Finite Coverage; Stratified Layers; The Wave Equation and Its General Solution; General Linear Response Theory for Surfaces; Surface Roughness.

R e a d e r s h i p :

Engineers, research scientists and graduate students in optics.

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