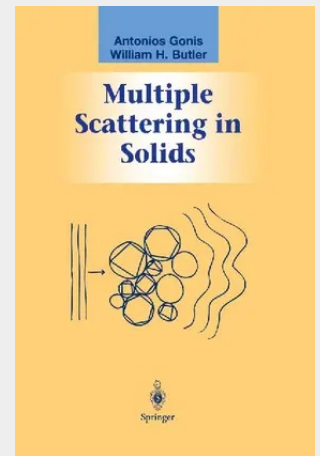


Multiple Scattering in Solids

The origins of multiple scattering theory (MST) can be traced back to Lord Rayleigh's publication of a paper treating the electrical resistivity of an array of spheres, which appeared more than a century ago. At its most basic, MST provides a technique for solving a linear partial differential equation defined over a region of space by dividing space into nonoverlapping subregions, solving the differential equation for each of these subregions separately and then assembling these partial solutions into a global physical solution that is smooth and continuous over the entire region. This approach has given rise to a large and growing list of applications both in classical and quantum physics. Presently, the method is being applied to the study of membranes and colloids, to acoustics, to electromagnetics, and to the solution of the quantum-mechanical wave equation. It is with this latter application, in particular, with the solution of the Schrödinger and the Dirac equations, that this book is primarily concerned. We will also demonstrate that it provides a convenient technique for solving the Poisson equation in solid materials. These differential equations are important in modern calculations of the electronic structure of solids. The application of MST to calculate the electronic structure of solid materials, which originated with Korringa's famous paper of 1947, provided an efficient technique for solving the one-electron Schrödinger equation.

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