



METADATA

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Abstract

This book is intended for undergraduate students studying in physics departments/schools and contains solved problems in condensed matter physics (CMP). It is perhaps the first book to solve problems in CMM, while serving as a supplement to a main textbook that traditionally contains the relevant theory along with, for the most part, unsolved exercises (if it contains exercises at all). Due to the complexity of problems in CMP, many of the problems cannot be solved analytically and therefore require numerical analysis methods. A typical example is the determination of energy bands in a one-dimensional solid described by the Kronig-Penney model—perhaps the simplest crystalline solid

imaginable—which requires the numerical solution of nonlinear (transcendental) equations (see relevant excerpt from indicative chapter). Thus, this book also contains problems that can only be solved using numerical methods, where the corresponding algorithms are presented - source codes in FORTRAN 90, which is the predominant programming language in the natural sciences. The problems solved refer to the syllabus corresponding to an introductory course in physics, which, in brief, covers the topics of chemical bonding in solids, crystal structure and diffraction, lattice dynamics (phonons), thermal properties, the free electron model, electron energy bands, and semiconductors.

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