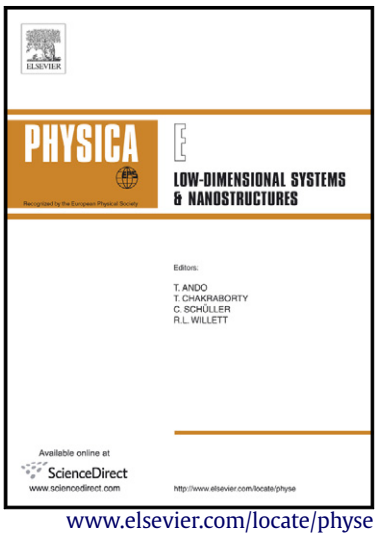

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Abstract

The single-particle states in a cylindrical nanotube placed in the field of charged ring are considered theoretically in the effective-mass approximation. The electrostatic field of charged ring creates an additional quantum well the symmetry axes of system. It is shown, that this quantum well can be described as one-dimensional modified Coulomb-like potential

By using a variation-method the wave functions and energy levels of the first two states of charge carriers in the well were obtained.

The interband and intraband electro-optical transitions in the tube are also considered.

Keywords

nanotube, quantum well, electrostatic field, energy levels, electroabsorption

PACS: 73.22.Dj; 78.67.Ch

1. Introduction

During the last decades along with various low-dimensional structures, semiconductor nanotubes (SNTs) are one of the urgent objects of investigation and had been studied extensively both experimentally and theoretically. SNTs represent a new class of nanotechnology building blocks and the interest in these systems is caused by a number of reasons. SNT is an emerging field and possesses potential to provide a wide range of functionalities. Research in the field of semiconductor nanotubes (see, for example, Refs. [1-7] and references therein) has been progressing into a mature subject with several highly interdisciplinary subareas such as nanoelectronics, nanophotonics, nanocomposites, biosensing, optoelectronics, and solar cells.