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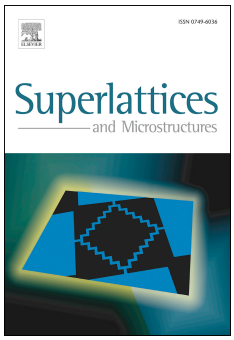

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The Rashba and Dresselhaus spin-orbit interactions in a two-dimensional quantum pseudo-dot system

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Abstract

We study the impact of the spin-orbit coupling due to both structure and crystal inversion asymmetry and external magnetic field on the level structure in a two-dimensional quantum pseudo-dot. It is demonstrated that, both the spin-orbit interactions and magnetic field strength have a great influence on energy eigenvalues of the system. Also, we found that an increase in magnetic field enhances the spin-orbit coupling strength. This phenomena leads to increase the energy eigenvalues and energy splitting due to the spin-orbit coupling.

Keywords: Two-dimensional quantum pseudo-dot; Spin-orbit coupling; Magnetic field; Energy levels.

1. Introduction

Impressive developments in nano-fabrication technology have opened up a rich field of studies based on the electronic structure and optical properties of semiconductor quantum dots and pseudo-dots[1, 2, 3, 4, 5, 6, 7, 8, 9]. In these structures a few electrons are confined at the semiconductor interface to form zero dimensional systems. The size-quantized effects in these structures produce many novel and peculiar properties which had not been observed in the bulk materials. Due to these peculiar properties, and the possibility of potential application in electronic and optoelectronic devices, semiconductor quantum dots and pseudo-dots have developed into one of the major research topics in recent years. One of the important features of these structures is

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