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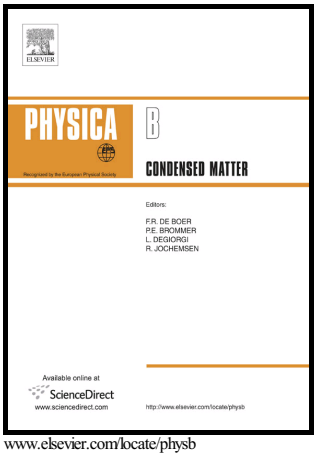

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OPTICAL TRANSITIONS IN SEMICONDUCTOR NANOSPHERICAL CORE/SHELL/SHELL HETEROSTRUCTURE IN THE PRESENCE OF RADIAL ELECTROSTATIC FIELD

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Abstract

The electronic states and optical properties of spherical nanolayer in the presence of the electrostatic radial field in the strong size quantization regime have been considered. Both analytical and numerical methods have been applied to the problem of one-electron states in the system. According to the intensity of the external electrostatic field, three regimes have been distinguished: week, intermediate and strong. Perturbative approach have been applied to the case of week, WKB to the case of intermediate and variation approach to the case of strong field intensities. The analytical dependencies of the one electron energy and wave function on the electric field value and geometrical parameters of the nanolayer have been achieved. The comparison of the results obtained by the analytical method with the results of the numerical method have been made. The interband and intraband optical transitions caused by incident optical light polarized in z direction have been considered in this system. The selection rules for this transitions have been obtained. The dependence of the absorption coefficient on the energy of incident light for both cases of interband and intraband transitions for every regime of the electrostatic field value have been received.

Graphical abstract

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