The Photon-Drag Effect in Cylindrical Quantum Wire with a Parabolic Potential

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Abstract : Using the quantum kinetic equation for electrons interacting with acoustic phonon, the density of the constant current associated with the drag of charge carriers in cylindrical quantum wire by a linearly polarized electromagnetic wave, a DC electric field and a laser radiation field is calculated. The density of the constant current is studied as a function of the frequency of electromagnetic wave, as well as the frequency of laser field and the basic elements of quantum wire with a parabolic potential. The analytic expression of the constant current density is numerically evaluated and plotted for a specific quantum wires GaAs/AlGaAs to show the dependence of the constant current density on above parameters. All these results of quantum wire compared with bulk semiconductors and superlattices to show the difference.

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Keywords : The photon-drag effect, the constant current density, quantum wire, parabolic potential

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