Calculations of the absorption coefficient of a weak electromagnetic wave by free carriers in doped superlattices by using the Kubo-Mori method

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Abstract: Analytic expressions for the high-frequency conductivity tensor and the absorption coefficient of a weak electromagnetic wave due to free carriers for the case of electron-optical phonon scattering in doped superlattices are calculated by using the Kubo-Mori method in two cases: the absence of a magnetic field and the presence of a magnetic field applied perpendicular to the barriers. In comparison with normal semiconductors, different dependence of the high-frequency conductivity tensor and the absorption coefficients on the electromagnetic wave frequency ??, the temperature T of the system, the cyclotron frequency ?? (when a magnetic field is present), and characteristic parameters of a doping superlattice is obtained. The analytic expressions are numerically evaluated, plotted, and discussed for a specific doping of the n-GaAs/ p-GaAs superlattice.

Author Keywords: Absorption coefficient; Conductivity tensor; Doped semiconductor superlattics

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