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Title:Intersubband absorption with difference-frequency generation in GaAs asymmetric quantum wells
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Abstract:An asymmetric quantum well (AQW) is designed to emit terahertz (THz) waves by using difference frequency generation (DFG) with the structure of GaAs/Alinf0.2/infGainf0.8/infAs/Alinf0.5/infGainf0.5/infAs. The characteristics of absorption coefficients are analysed under the parabolic and non-parabolic energy-band conditions in detail. We find that the absorption coefficients vary with the two pump optical intensities, and they reach the maxima when the pump wavelengths are given as λinfp1/inf = 9.70 μm and λinfp2/inf = 10.64 μm, respectively. Compared with non-parabolic conditions, the total absorption coefficient under parabolic conditions shows a blue shift, which is due to the increase in the energy difference between the ground and excited states. By adjusting the two pump optical intensities, the wave vector phase-matching condition inside the AQW is satisfied. © 2012 Chinese Physical Society and IOP Publishing Ltd.
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