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标题: Theory and modeling of electrically tunable metamaterial devices using inter-subband transitions in semiconductor quantum wells
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摘要: In this paper, we propose a new and versatile mechanism for electrical tuning of planar metamaterials: strong coupling of metamaterial resonances to engineered intersubband transitions that can be tuned through the application of an electrical bias. We present the general formalism that allows calculating the permittivity tensor for intersubband transitions in generic semiconductor heterostructures and we study numerically the specific case of coupling and tuning metamaterials in the thermal infrared through coupling to biased GaAs semiconductor quantum wells. This tuning mechanism can be scaled from the visible to the far infrared by the proper choice of metamaterials and semiconductor heterostructures. (C) 2012 Optical Society of America
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