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Title:Extraordinary THz transmission through subwavelength semiconductor slits under antiparallel external magnetic fields
Authors:Liu, Zhifeng (1); Jin, Guojun (1)
Author affiliation:(1) National Laboratory of Solid State Microstructures, Department of Physics, Nanjing University, Nanjing 210093, China
Corresponding author:Jin, G.(gjin@nju.edu.cn)
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Abstract:We theoretically study the resonant transmission of electromagnetic waves at the THz frequencies through subwavelength semiconductor slits under external static magnetic fields. The dispersion relations of the surface plasmon polaritons (SPPs) inside a subwavelength slit are analytically derived. It is found that the SPPs propagating along one direction and its reverse are symmetric when parallel external magnetic fields are applied, but are asymmetric when antiparallel external magnetic fields are applied. The transmission properties of periodic subwavelength semiconductor slit arrays with the antiparallel magnetic fields in each unit cell are investigated by the mode expansion technique. The two significant transmission characteristics are observed: (i) The resonant peaks are redshifted with increasing external magnetic fields; (ii) The transmissions in the two opposite directions through the slit arrays are asymmetric. The origin of the transmission asymmetry is reasonably explained by the magnetic-field induced asymmetric SPP propagation losses.
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