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Asymmetric transmission of terahertz waves in graphene-loaded photonic systems YU ZHOU, REN-HAO FAN, Nanjing University, QING HU, Massachusetts Institute of Technology, RU-WEN PENG, MU WANG, Nanjing University — In this work, we have proposed two types of graphene-loaded photonic systems, through which terahertz(THz) waves present asymmetric transmission tuned by external magnetic field. One is a graphene-loaded metal grating. It is found that resonant modes in the system can be converted between transverse-electric and transverse-magnetic polarizations due to Hall conductivity of graphene. As a consequence, asymmetric transmission of THz waves through this graphene-loaded metal grating is achieved. The other is a photonic crystal cavity integrated with graphene. Non-reciprocal propagation of THz waves has been verified in this system. By adjusting the external magnetic field or the Fermi level of graphene, asymmetric wave propagation can be significantly tuned. Our investigations offer unique approaches to achieve potentially applications in the design of the graphene-loaded tunable devices such as THz isolators and diodes.

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Yu Zhou
Nanjing University

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