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Title:Characteristics of the twisted conjugated gammadion chiral structure

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Abstract:A new nanometer twisted conjugated gammadion chiral structure is proposed, and the twisted angle of upper and lower layers of the structure is optimized. The transmission and reflection spectra for the incident wave with different frequencies are obtained from numerical simulations. The resonance dips of the transmission spectra at the frequencies of 145 and 300 THz are observed. The circular dichroism, polarization azimuth rotation angle are calculated from simulated transmission and reflection spectra. The results show that the larger circular dichroism and exceptionally strong optical activity are found at the resonance frequency region. The maximum polarization azimuth rotation angle  $\theta$  can reach  $95^\circ$ . Then the effective parameters of the structure, including relative permittivity, relative permeability, chiral parameter and refractive indexes, are retrieved from simulated transmission and reflection spectra. It is found that the negative refractive indexes of the right-handed circularly polarized and left-handed circularly polarized waves of the structure can be realized at the resonance frequency region. The numerical results demonstrate that the negative refractive index of the chiral metamaterial is due to the large chiral parameter.

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