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Title:Reversible modulation and ultrafast dynamics of terahertz resonances in strongly photoexcited metamaterials
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Abstract:We demonstrate an ultrafast reversible modulation of resonant terahertz (THz) response in strongly photoexcited metamaterials. The transient spectral-temporal response of the dipole transition ~1.6 THz exhibits a distinct nonmonotonic variation as a function of pump fluence. The transition energy shift, strength, spectral width, and density-dependent ultrafast relaxation manifest a remarkable reemergence of the transmission dip after initial quenching. Our simulations, incorporating the first-order diffraction from the photoinduced transient grating, reproduce the salient features, providing a new avenue for designing nonlinear and frequency-agile THz modulators.
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