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The Effective AC Response of Nonlinear Composites

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Abstract: A perturbative approach is used to study the AC response of nonlinear composite media, which obey a current-field relation of the form $J=\sigma E+\chi|E|^2E$ with components having nonlinear response at finite frequencies. For a sinusoidal applied field, we extend the local potential in terms of sinusoidal components at fundamental frequency and high-order harmonic frequencies to treat the nonlinear composites. For nonlinear composite media with a low concentrations of spherical inclusions, we give the formulae of the nonlinear effective AC susceptibility $\chi^*_{3\omega}$ at the third harmonic frequency.

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Key words: nonlinear composite, effective nonlinear susceptibility

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