Abstract

Low Frequency Corrections to the Static Effective Dielectric Constant of a Composite Material with a Cubic Lattice of Identical Spheres

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Using the expressions for dynamic lattice sums and equations for determining the coefficients of Debye potentials:

$$S_{im}^{\gamma}(k, K_1) = \sum y_i(kR_p)T(\varphi_p, \phi_p)e^{ik_i R_p},$$

$$\sum_{l_1,m_1}(\delta_{ll}, \delta_{mm_1} + T^{\gamma^{-1}}\sigma_{lm;l_1m_1})A_{l_1m_1}^{\gamma} = 0.$$

for a 3-dimensional cubic lattice of identical spheres we discuss the low frequency corrections to the static effective dielectric constant of composite materials with this triply periodic lattice. In comparison with the results of homogenization problem in Maxwell-Garnett approximation we drive the first dynamic correction to the effective refractive index for a cubic lattice spheres and a constraints on the wavenumber region for which the Maxwell-Garnett approximation is accurate.

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