

Effective Dielectric Response of Composites with Graded Material

YANG Zi-Dong,¹ WEI En-Bo,² and SONG Jin-Bao²

¹ School of Agriculture and Light Industry Engineering, Shandong University of Technology, Zibo 255049, China

² Institute of Oceanology, the Chinese Academy of Sciences, Qingdao 266071, China
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Abstract: The effective dielectric response of linear composites containing graded material is investigated under an applied electric field E_0 . For the cylindrical inclusion with gradient dielectric function, $\epsilon_i(r)=b+cr$, randomly embedded in a host with dielectric constant ϵ_m , we have obtained the exact solution of local electric potential of the composite media regions, which obeys a linear constitutive relation $D=\epsilon E$, using hypergeometric function. In dilute limit, we have derived the effective dielectric response of the linear composite media. Furthermore, for larger volume fraction, the formulas of effective dielectric response of the graded composite media are given.

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Key words: effective dielectric response, graded composite, effective medium approximation

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