

Abstract Submitted  
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**Localization of electric fields in graded core-shell metamaterial structures**<sup>1</sup> KIN WAH YU, Chinese University of Hong Kong, EN BO WEI, Institute of Oceanology, Chinese Academy of Sciences — The electric-field distribution has been investigated in a cylindrical metamaterial structure under the illumination of a uniform incident optical field. The structure consists of a homogeneous dielectric core, a shell of metal-dielectric metamaterial with gradually varying Drude permittivity, embedded in a uniform matrix. In the quasistatic limit, the electric potentials and hence the electric fields have been derived exactly and analytically in terms of hypergeometric functions. Our results showed that the electric field distribution exhibits a prominent peak inside the shell, that can be confined to a desired position by varying the frequency of the optical field and the parameters of the permittivity profiles. Thus, by fabricating graded metamaterials, it is possible to control electric-field distribution spatially. We offer an intuitive explanation for the gradation-controlled electric-field distribution.

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