

HOMOGENIZATION OF MAXWELL'S EQUATIONS IN A THIN PERIODIC LAYER TO STUDY FARADAY CAGE-LIKE EFFECT

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Abstract

This work considers the Maxwell equations for two domains separated by a heterogeneous layer. The layer has a δ -periodic structure in the $x_1 - x_2$ plane and is cylindrical in the x_3 direction, where $\delta \ll 1$. The layer consists of a one-connected component (metallic layer) and a collection of disconnected regions. The connected part is made of highly conductive material, while the disconnected regions are filled with air or a non-conductive material. The main difficulty arises due to the purely real-valued permittivity coefficient in the disconnected regions of the layer, while in the metallic part, the complex part of the permittivity coefficient is non-zero parameter, ε . We have considered several cases for the pair (δ, ε) , and studied the asymptotic behavior of the considered Maxwell system and three different types of limit interface problems: partial shielding, full shielding, and no shielding.

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