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Generalized impedance boundary conditions for scattering problems from strongly absorbing obstacles: the case of Maxwell's equations. (English) Zbl 1170.35094

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The authors consider the diffraction of waves by highly conducting materials in electromagnetism. In such a case, it is the well-known skin effect that creates a “thin layer” phenomenon.

Generalized Impedance Boundary Conditions (GIBCs) are used in electromagnetism for time harmonic scattering problems from obstacles that are partially or totally penetrable. The general idea is to replace the use of an “exact model” inside (the penetrable part of) the obstacle by approximate boundary conditions. These boundary conditions can be seen as higher order approximations of a perfect conductor condition.

In this paper the authors consider the 3-D case with Maxwell equations in a harmonic regime.

The construction of GIBCs is based on a scaled asymptotic expansion with respect to the skin depth. The asymptotic expansion is theoretically justified at any order and explicit expressions till the third order are given. These expressions are used to derive the GIBCs. The associated boundary value problem is analyzed and error estimates are obtained in terms of the skin depth.

Reviewer: [Michael Perelmuter \(Kyiv\)](#)

MSC:

[35Q60](#) PDEs in connection with optics and electromagnetic theory

[35P25](#) Scattering theory for PDEs

[78A45](#) Diffraction, scattering

[35C20](#) Asymptotic expansions of solutions to PDEs

Cited in **25** Documents

Keywords:

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