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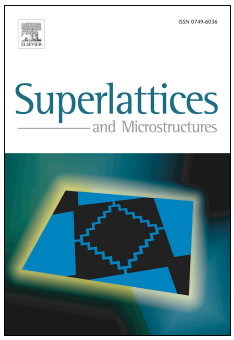

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Illia V. Fedorin

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Electrodynamic properties of a hypercrystal with ferrite and semiconductor layers in an external magnetic field

Illia V. Fedorin*

National Technical University Kharkiv Polytechnic Institute, 2 Kyrpychova Str., 61002, Kharkiv, Ukraine

Abstract

Electrodynamic properties of a photonic hypercrystal formed by periodically alternating two types of anisotropic metamaterials are studied. The first metamaterial consists of ferrite and dielectric layers, while the second metamaterial consists of semiconductor and dielectric layers. The system is assumed to be placed in an external magnetic field, which applied parallel to the boundaries of the layers. An effective medium theory which is suitable for calculation of properties of long-wavelength electromagnetic modes is applied in order to derive averaged expressions for effective constitutive parameters. It has been shown that providing a conscious choice of the constitutive parameters and material fractions of magnetic, semiconductor, and dielectric layers, the system under study shows hypercrystal properties for both TE and TM waves in the different frequency ranges.

Keywords: spectral properties, hypercrystals, metamaterials, effective medium theory
PACS: 42.25.Bs, 75.70.Cn, 78.20.Ls, 78.67.Pt

1. Introduction

Recently, a lot of investigations are pointed to the artificial periodical structures, metamaterials and photonic crystals, which include layers made

*National Technical University Kharkiv Polytechnic Institute, 2 Kyrpychova Str., 61002, Kharkiv, Ukraine

Email address: fedorin.ilya@gmail.com (Illia V. Fedorin)