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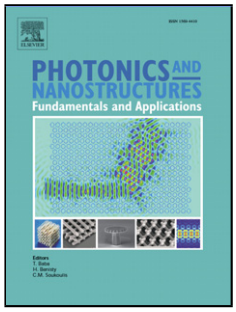

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Bi-gyrotropic single-negative magnetic materials in the presence of longitudinal magnetization: a transfer matrix approach

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Abstract

In a single-negative medium, electric permittivity (ϵ) or magnetic permeability (μ) coefficients are negative. In order to use the potential of magnetic metamaterials, in the present study, we have investigated bi-gyrotropic single-negative magnetic materials (BSNMMs) having their ϵ and μ in the form of non-diagonal tensors. At first, we have introduced a transfer matrix method (TMM) based-approach for studying optical and magneto-optical (MO) properties of BSNMMs and multilayer structures containing them in the case of longitudinal configuration of magnetization. Then, we have studied numerical computation on the reflection geometry for both ϵ-negative and μ-negative typical BSNMMs for different permittivity and permeability values.

Keywords: Bi-gyrotropic magnetic medium, Single-negative metamaterial, Longitudinal magnetization, Transfer matrix method.

1. Introduction

Nowadays, advances in simulation and fabrication technologies provide a rather broad flexibility in the design of metamaterials and, hence, their electromagnetic responses with super performances. The potential ability to engineer the electromagnetic responses of materials for a wide variety of applications has

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