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Quantum input-output relations for lossy and anisotropic multilayer magnetodielectric meta-material

M Hoseinzadeh¹, E Amooghorban*^{1,2} and A Mahdifar^{1,2}

1. Department of Physics, Faculty of Science, Shahrekord University, Shahrekord, Iran

2. Photonics Research Group, Shahrekord University, Shahrekord, Iran

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Abstract

In this paper, we quantize electromagnetic field in, lossy, dispersive and anisotropic magnetodielectric media by using phenomenological approach. We obtain quantum input– output relations for anisotropic multilayer metamaterials. As an application of our approach, we investigate the dissipative and anisotropic effects of an anisotropic magnetodielectric slab on the quantum properties of incident input states. For this purpose, quadrature squeezing and Mandel parameter of output states has been calculated by modeling the anisotropic magnetodielectric slab through Lorentz model for a situation in which the incident states on the right and left side of the magnetodielectric slab are two- mode coherent states and quantum vacuum state, respectively.

Keywords: multilayer metamaterial, quantization of electromagnetic field, Anisotropy quadrature squeezing and Mandel parameter

For full article, refer to the Persian section