Analysis of optical properties in cylindrical dielectric photonic crystal

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Abstract

In this work, theoretical formulas for the H-polarization electromagnetic propagation in a cylindrical multilayer structure (CMS) are given. The relationships between two modes, H- and E-polarization are pointed out. With the derived formulae, we present the numerical results for three model structures such as the single cylindrical interface, the single cylindrical slab, and the cylindrical photonic crystal (CPC). In the single cylindrical interface, it is found that there exists a Brewster starting radius at which a minimum reflectance is attained in H-polarization. In the single cylindrical slab, the result illustrates that the reflectance response in the wavelength domain contains the oscillating and nonoscillating regions. As for the CPC, we find the PBG structure at zero azimuthal mode number is very similar to that of planar photonic crystal. The PBG, however, can be strongly influenced by increasing the azimuthal mode number in a CPC.

Keyword：photonic crystal