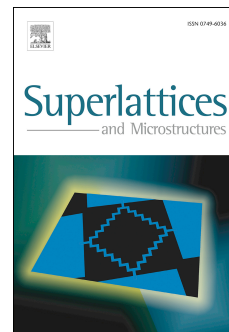


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Estimation of photonic band gap in the hollow core cylindrical multilayer structure

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Abstract:

The propagation characteristic of two hollow core cylindrical multilayer structures having high and low refractive index contrast of cladding regions have been studied and compared at two design wavelengths i.e. 1550nm and 632.8nm. With the help of transfer matrix method a relation between the incoming light wave and outgoing light wave has been developed using the boundary matching technique. In high refractive index contrast, small numbers of layers are sufficient to provide perfect band gap in both design wavelengths. The spectral position and width of band gap is highly depending on the optical path of incident light in all considered cases. For sensing application, the sensitivity of waveguide can be obtained either by monitoring the width of photonic band gap or by monitoring the spectral shift of photonic band gap. Change in the width of photonic band gap with the core refractive index is larger in high refractive index contrast of cladding materials. However, in the case of monitoring the spectral shift of band gap, the obtained sensitivity is large for low refractive index contrast of cladding materials and further it increases with increase of design wavelength.

Keyword: Bragg fiber waveguide, Transfer matrix method, high and low contrast cladding, sensitivity.

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