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Microwave properties of the generalized Fibonacci quasi-periodic multilayered photonic band gap structure

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Keywords

generalized Fibonacci multilayer, photonic crystal, Fibonacci dielectric multilayer, microwave band gap structure

Abstract

The transmission properties in microwave domains (10 GHz to 40 GHz) of generalized dielectric Fibonacci multilayer generated by the rule $S_{l+1} = S_l^m S_{l-1}^n$: with a pair of positive integers m and n were studied. The initial generations of generalized Fibonacci sequence are taken as follows: $S_0 = L$ and $S_1 = H$, where H and L are two elementary layers with refractive indices $n_L = 1$ (air) and $n_H = 3$ (ceramic). The so-called "trace map method" was used to simulate the transmission spectra of the multilayer structures at normal incidence. Based on the representation of the transmittance spectra in the microwave range an analysis depending on the pair (n, m) is presented. It has been shown that the reflection bands of the proposed quasi-periodic structure could cover the whole spectral range. By comparison, it is impossible to reach this result by using the periodical multilayer structure.



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