Abstracts

Coupled defects in photonic crystals

A.L. Reynolds, U. Peschel, F. Lederer, P.J. Roberts, T.F. Krauss and P.J.I. de Maagt. "Coupled defects in photonic crystals." 2001 Transactions on Microwave Theory and Techniques 49.10 (Oct. 2001, Part II [T-MTT] (Special Issue on Microwave and Millimeter-Wave Photonics)): 1860-1867.

We present a theoretical and numerical description of coupled defects in photonic-bandgap crystals, expandable to cover a wide range of applications. Based on a weak interaction approach, explicit expressions are derived for defect interaction. The basis is formed by a system of coupled ordinary differential equations for the field amplitudes for individual defects. The actual configuration of the defects (chain, lattice, bend, or anything else) enters the equations as a linear coupling between neighboring defects. The strength of this method is that many solutions of this system are known analytically; the band structure as well as the transmission response of a defect chain, or of a defect lattice, can be determined. The results for the superlattice of defects are compared with widely accepted numerical methods, the transfer matrix method, and finite-difference time domain method.

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