Fast and effective numerical methods for 2D photonic crystals

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In this article we develop two numerical methods to compute the band spectra of 2D photonic crystals without impurities, a finite difference frequency domain (FDFD) method and a finite element frequency domain (FEFD) method. Exploiting periodicity to identify discretization points differing by a period, the computational complexity of the algorithms is reduced significantly. Numerical results on the three test problems most considered in the literature are presented.

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