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Title:Modal analysis of metal-stub photonic band gap structures in a parallel-plate waveguide Authors:Yuan, C.P. (1); Chang, Tsun-Hun (1)

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Abstract: This work presents a theoretical method to solve metal- stub photonic-band-gap (PBG) problems based on the multiple- scattering and modal analysis methods. The multiple-scattering method is generalized, which replaces the scattering coefficient by a mode-coupling matrix. Corresponding sizes between the full dielectric cylinder and the metal stub could be determined based on modal analysis. The metal stub can generate a similar frequency response to that of the full dielectric cylinder, implying that the metal stub is a good substitute for the dielectric cylinder. An experiment conducted at a low terahertz region verifies the theoretical predictions. This work offers a possibility to design two-dimensional photonic crystals using metal stub by adjusting its height for low terahertz applications.