November 13
Shari Moskow
Drexel University

Scattering and Resonances of Thin Photonic Structures

Motivated by the development of photonic band gap materials, we consider the scattering and computation of resonances by a thin structure heterogeneous structure – typically periodic with a defect. Helmholtz's equation with variable coefficient models the wave phenomena. The scatterer is assumed to have a high index of refraction while at the same time it is very small in one of the dimensions. We show that if the index scales as O(1/h), where h is the thickness of the scatterer, then an approximate solution, based on perturbation analysis, can be obtained. The approximate solution consists of a leading order term plus a corrector, each of which solves an integral equation in 2D for a 3D problem. We provide error analysis on the approximation and compare the computation of the resonances by two proposed approaches.