Wave scattering in layered media

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Thursday, April 11, 2013
007 Kemeny Hall, 4:00PM
Tea 3:30PM 300 Kemeny Hall

Abstract

Wave scattering in inhomogeneous media has widespread applications ranging from the geosciences to quantum mechanics. Planar-layered media are the most fundamental structures in science and engineering applications such as micro-strip antennae, thin-film solar cells, and meta-materials. As a result, numerical simulation of the Helmholtz and Maxwell equations in layered media plays an important role for these applications as they can be employed for design optimization and reduce the cost of experiments or fabrication. Therefore, the development of fast and robust solvers on high-performance parallel computers is critically important. Furthermore, in order to take advantage of all the computing resources, one requires a well-designed algorithm that can utilize all the potential computing powers whether in personal computers or clusters. In this talk, two algorithmic issues for integral equations in layered media will be discussed: 1. Green's function in layered media and 2. a massively parallel fast solver with fast multipole method (FMM).

This talk should be accessible to graduate students.