The Hong Kong Polytechnic University
Department of Applied Mathematics

Colloquium

Computing Highly Oscillatory Problems Faster and More Accurately

by

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Abstract

Fast and accurate computations of optical wave devices such as waveguides and couplers have been crucial to the development of light integrated systems. Core parts of such calculations often involve advanced computational procedures for investigating the wave propagation characteristics via highly oscillatory differential equations of integrals. While the beam propagation method, which is based on fast Fourier transforms, has been popular in the study, different decomposition schemes and Filon Type methods are also introduced to the research. To improve the accuracy of a numerical method used, a traditional approach is to increase the density of the grid or decrease the mesh step sizes utilized. With a uniform mesh and step size, the cost for doing so may quickly become prohibitive if a high wave frequency is encountered. Nonuniform mesh structures and step sizes, on the other hand, may offer certain advantages in the situation.

However, they are often cumbersome to implement in industrial applications. This talk will introduce a number of the latest approaches in the area for highly accurate, yet rapid numerical methods for solving paraxial, or parabolic, wave equations in order to separate inaccuracies inherent in numerical methods from inaccuracies due to paraxial waves. This talk will be suitable for all graduate and senior undergraduate students.

Date : 27 November, 2015 (Friday)
Time : 3p.m. – 4p.m.
Venue : TU801, The Hong Kong Polytechnic University

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