The Hong Kong University of Science and Technology

Department of Mathematics

<u>Seminar on Applied Mathematics</u>

Wave scattering problems in two-layered media: condition at infinity and numerical methods

by

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<u>Abstract</u>

In this talk, I will present some recent results for wave scattering in a two-layered medium by two reduced rough surfaces: a local perturbation of a straight line, and a step-function surface with a finite vertical segment, a global perturbation of a straight line. To ensure the wellposedness, it is known that the angular spectral representation (ASR) condition can be imposed at infinity. However, unlike the classical Sommerfeld radiation condition, ASR allows incoming waves at infinity so that traditional truncation methods, such as absorbing boundary condition or perfectly matched layer (PML), become unavailable. To overcome this issue, we desire sharper radiation conditions that can extract purely outgoing waves from the total wavefield. For the locally perturbed surface, it has been proven that the perturbed wavefield due to the local perturbation is purely outgoing at infinity. Based on this sharper radiation condition, I will present a PML-based boundary integral equation (BIE) method to solve the scattering problem. For the globally perturbed surface, I will introduce a new radiation condition at infinity which, as was desired, extracts outgoing waves at infinity, and will present a PML-based numerical mode matching method to solve the problem. Numerical results will be presented to demonstrate the performance of our methods.

Date: **Friday, 24 August 2018**
Time: **2:30p.m. – 3:30p.m.**
Venue: **Room 3494, Academic Buildings (Lifts 25, 26), HKUST**
All are welcome!