Mathematics, Statistics, and Computer Science **@ UIC**

Mathematics and its Applications Seminar

Transmission Eigenvalues and Inverse Scattering Theory

David Colton (University of Delaware)

Abstract: The transmission eigenvalue problem is a new class of non-selfadjoint eigenvalue problems that first appeared in inverse scattering theory. This problem can be viewed as the dual of the well known ''cloaking problem'' where now,for a given inhomogeneous medium,one seeks an incident wave for which the inhomogeneous medium is invisible, i.e. there is no scattered field. It can be shown that this can occur for at most a discrete set of values of the wave number and such values are called transmission eigenvalues. It has only recently been shown that for a non-absorbing medium real transmission eigenvalues exist and that these eigenvalues can be determined from a knowledge of the far field pattern of the scattered wave. Through the derivation of Faber-Krahn type inequalities for transmission eigenvalues one can obtain estimates for the index of refraction of the medium,thus opening up new possibilities for investigating the inverse scattering problem for both acoustic and electromagnetic waves. It can further be shown that for a spherically stratified medium the transmission eigenvalues uniquely determine the index of refraction up to a normalizing constant. This talk will provide a brief survey of the above results as well as the formulation of open problems whose solution is necessary for further progress.

Wednesday, March 17 at 4:00 PM in SEO 636