Additional McGill Computational Science and Engineering Seminar

Friday February 9th at 10:30 in Burnside Hall room 1214

Problems and Solutions in Scattering Theory

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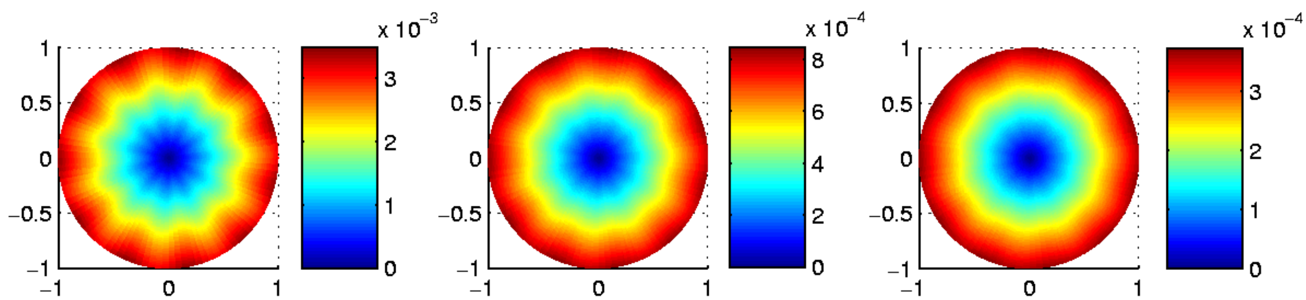
Scattering theory encompasses a huge range of natural phenomena. A historically rich mathematical discipline, it continues to challenge and engage many researchers.

In this talk, a selection of problems in scattering theory is presented. An overview of important theoretical issues and associated numerical difficulties is provided.

One interesting problem - both in terms of mathematics and application - is that of the scattering of waves from a thinly-coated obstacle. For example, what is the behaviour of a polarized electromagnetic wave which impinges on a painted antenna? Does the paint affect the outgoing rays, and if so, how? What happens to the fields inside the paint?

A novel solution strategy is presented for such a problem, involving the use of asymptotic analysis in conjunction with variational methods for non-local boundary value problems. The discretization of this method leads to a sequence of finite-element and boundary element problems, with some surprising results. A sketch of the procedure and an insight into the theoretical justification is presented.



The asymptotics work! Error between the exact and asymptotic solutions, as the thickness decreases.