Scattering on a penetrable composite obstacle in conservative and non-conservative setups

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Abstract

I will discuss the construction of the mathematical scattering theory (in both self-adjoint and non-self-adjoint settings) for wave propagating through a compact composite which comprises a penetrable matrix with inclusions made of a different material. Our aim is to consider this problem in the situation viable from the point of view of applications, i.e., when the inclusions are much stiffer than the matrix (with applications in, say, computer tomography and beyond).

It proves convenient to construct the scattering theory in this setup by following the overall recipe suggested by Naboko, based upon the theory of functional models of dissipative operators. The advantages of this approach are twofold: firstly, we are able to carry out the construction in both conservative and non-conservative cases, and secondly, an explicit description of the scattering matrix is easily obtained in terms of Dirichlet-to-Neumann maps.

The talk is based on the joint work with K. Cherednichenko and L. Silva.