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Transmission eigenvalues

Transmission eigenvalues arise from scattering theory. They correspond to energies, where there can be incoming waves that do not scatter at all. This is equivalent to the case where the scattering amplitude interpreted as an operator in the unit sphere is not injective. This concept is important in many constructive methods for solving inverse scattering problem such as the linear sampling method of Colton and Kirsch or in the factorization method of Kirsch.
In the talk we discuss the interior transmission problem and transmission eigenvalues for multiplicative perturbations of linear partial differential operator of order ≥ 2 with constant real coefficients. A reduction of the transmission eigenvalue problem for multiplicative sign-definite perturbations of elliptic operators with constant coefficients to an eigenvalue problem for a non-selfadjoint compact operator will be given. Sufficient conditions for the existence of transmission eigenvalues and completeness of generalized eigenstates for the transmission eigenvalue problem are derived. In the trace class case, the generic existence of transmission eigenvalues is established. By reconstructing a semiclassical parametrix we show that all but finitely many complex transmission eigenvalues are confined to a parabolic neighborhood of the positive real axis.
This is a joint project with M. Hitrik, K. Krupchyk and P. Ola.