

The Perturbation of Transmission Eigenvalues for Inhomogeneous Media in the Presence of Small Penetrable Inclusions

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This work concerns the transmission eigenvalue problem for an inhomogeneous media of compact support containing small inclusions. Assuming that the inhomogeneous background media is known and smooth, we investigate how these small volume inclusions affect the real transmission eigenvalues. Note that for practical applications the real transmission eigenvalues are important since they can be measured from the scattering data. In particular, in addition to proving the convergence rate for the eigenvalues corresponding to the perturbed media as inclusions' volume goes to zero, we also provide the explicit first correction term in the asymptotic expansion for simple eigenvalues. The correction terms involves the eigenvalues and eigenvectors of the unperturbed known background as well as information about the location, size and refractive index of small inhomogeneities. Thus, our asymptotic formula has the potential to be used to recover information about small inclusions from a knowledge of real transmission eigenvalues.

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