Transmission Eigenvalues and Invisibility

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We consider a non-self-adjoint fourth order eigenvalue problem using a discontinuous Galerkin (DG) method. For high order problems, DG methods are competitive since they use simple basis functions and have less degrees of freedom. We propose an interior penalty discontinuous Galerkin method using C^0 Lagrange elements (C0IP) for the transmission eigenvalue problem and prove the optimal convergence. We also consider invisibility cloaking in acoustic wave scattering. The proposed cloaking device takes a three-layer structure with a cloaked region, a lossy layer and a cloaking shell. This is mainly based on studying a novel type of interior transmission eigenvalue problems and their connection to invisibility cloaking.