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Convergence of Galerkin approximations for differential eigenvalue problems with derivative discontinuities. Preliminary report.

The eigenfunctions and eigenvalues of the depth separated underwater acoustic wave equation in a two-layer waveguide with a piecewise smooth density and sound speed profile is approximated using the Galerkin method based on a two-layer waveguide with piecewise constant density and sound speed. The rate of convergence of the Galerkin approximation, to the eigenpairs, is demonstrated for the case where the derivative discontinuity of the eigenfunctions at the interface, between the two layers, is chosen to be the same in both problems. (Received August 07, 2007)