GENERALIZED STEKLOV EIGENVALUE PROBLEMS

OLAF STEINBACH, MARCO ZANK

Abstract. We consider the generalized Steklov eigenvalue problem
\[-\Delta u = 0 \quad \text{in } \Omega, \quad \partial_n u = \lambda Bu \quad \text{on } \Gamma = \partial \Omega\]
where $B : H^{1/2}(\Gamma) \to H^{-1/2}(\Gamma)$ is some suitable chosen operator. We discuss and analyze related boundary integral operator eigenvalue problems and their discretizations via boundary element methods. Of particular interest are the relations of the Steklov eigenvalues with associated eigenvalues of boundary integral operators, in particular of the double layer boundary integral operator and its contraction property in $H^{1/2}(\Gamma)$, and their relations to the interior and exterior Dirichlet energies. Numerical results are given which underline the theoretical considerations.

Keywords: Steklov eigenvalue problem, boundary element methods

Mathematics Subject Classifications (2010): 65N25, 65N38

Institute of Computational Mathematics, TU Graz, Steyrergasse 30, 8010 Graz, Austria
E-mail address: o.steinbach@tugraz.at, zank@math.tugraz.at