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Virtual element approximation of the Steklov eigenvalue problem

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ABSTRACT

In this work we develop a virtual element method for the two-dimensional Steklov eigenvalue problem. We propose a discretization by means of the virtual element method. Under standard assumptions on the computational domain, we establish that the resulting scheme provides a correct approximation of the spectrum and prove optimal order error estimates for the eigenfunctions and a double order for the eigenvalues. We also prove higher order error estimates for the computation of the eigensolutions on the boundary, which in some Steklov problems (computing sloshing modes, for instance) provides the quantity of main interest (the free surface of the liquid). Finally, we report some numerical tests supporting the theoretical results.

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