COMPUTATIONAL LOWER BOUNDS OF THE MAXWELL EIGENVALUES

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ABSTRACT

In this talk we propose a method to compute guaranteed lower bounds to the eigenvalues to the Maxwell system in two or three space dimensions. We apply the idea by Liu and Oishi [1] to numerically quantify the convergence of the Galerkin projection in the L^2 norm by solving an auxiliary eigenvalue problem based on the hypercircle principle. In order to be able to explicitly control the error arising from replacing the right-hand side in a source problem by some piecewise polynomial approximation, we employ the local bounded cochain projection introduced by Falk and Winther and compute upper bounds on its stability constant. This situation is different from the Laplace operator, where such a perturbation is easily controlled through local Poincaré inequalities. The practical viability of the approach is demonstrated in two-dimensional test cases.

References

[1] X. Liu, S. Oishi. *Verified eigenvalue evaluation for the Laplacian over polygonal domains of arbitrary shape*, SIAM Journal Numerical Analysis (2013), pp. 1634–1654.

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