A POSTERIORI ERROR ESTIMATES FOR THE MAXWELL'S EIGENVALUE PROBLEM

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ABSTRACT. We present here a posteriori estimates of the error in the H($\mathbf{curl}$)-norm for the numerical approximation of Maxwell's eigenvalue problem by means of Nédélec finite elements. Our analysis is based on introducing an auxiliary mixed problem that is equivalent in some sense to the original one and it is used only for theoretical purposes. We derive the a posteriori error estimates for these auxiliary quantities first. It is based on a Helmholtz decomposition of the error and on a superconvergence result between the L^2-orthogonal projection of the eigenfunction onto the curl of the Nédélec space and the eigenfunction approximation. Furthermore, reliability and local efficiency of the proposed error estimator for the original eigenfunction is proved up to higher order terms. Numerical results illustrate the behaviour of the error indicators. Details can be found in [1, 2].

Keywords: a posteriori error estimate, Maxwell's eigenvalue problem, mixed formulation, Helmholtz decomposition

Mathematics Subject Classifications (2010): 65N25, 65N15, 65N30

REFERENCES

[1] D. Boffi, L. Gastaldi, R. Rodríguez and I. Šebestová. *Residual-based a posteriori error estimation for the Maxwell's eigenvalue problem. IMA J. Numer. Anal.*, 37(4): 1710-1732, 2017.

[2] D. Boffi, L. Gastaldi, R. Rodríguez and I. Šebestová. *A posteriori error estimates for Maxwell's eigenvalue problem. J. Sci. Comput.*, https://doi.org/10.1007/s10915-018-0808-5 .

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