

NUMERICAL APPROXIMATION OF THE SPECTRUM OF THE CURL OPERATOR IN MULTIPLY CONNECTED DOMAINS

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ABSTRACT. The aim of this work is to analyze the numerical approximation of the eigenvalue problem for the curl operator on a multiply connected domain. In order to obtain a well-posed eigenvalue problem, additional constraints must be imposed (see [3]). A combination between two type of constraints related to the homology of the domain have been added in order that the problem has a discrete spectrum (see [2]). A mixed variational formulation of the resulting problem and a finite element discretization are introduced and shown to be well-posed. Optimal-order spectral convergence is proved, as well as a priori error estimates, by using classical spectral approximation results (see [1]). It is described how to implement this numerical method taking care of these additional constraints. Finally the results of some numerical tests are also reported.

Keywords: Eigenvalue problems, finite elements, spectrum of the curl operator, multiply connected domains.

Mathematics Subject Classifications (2010): Primary: 65N25, 65N30; Secondary: 76M10, 78M10.

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