# ON THE APPROXIMATION OF MAXWELL'S EIGENVALUES WITH NODAL ELEMENTS

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Abstract. The numerical discretization of the eigenvalue problem associated with the Maxwell system is the object of a wide and vibrant literature. Despite its simple formulation, it is generally understood that the use of classic Lagrangian (*nodal*) finite elements is prone to spectral pollution, leading to unreliable results.

It is universally recognized that the use of Nédélec (*edge*) finite elements is the most natural approach in order to get optimally convergent solutions and the absence of spurious modes [1].

In this talk we will review this subject and discuss some recent results where the use of nodal element can be successfully applied to the problem under consideration.

In particular, a long standing open problem is solved in [2], and its generalization is presented in [3]. It refers to a method proposed in [4] which is now proved to be optimally convergent.

Another convergent scheme arises from stabilized formulations that can be motivated by a variational multiscale approach [5].

Finally, by combining a formulation analyzed in [7] and a least squares approach proposed in [6], we introduce a new and simple scheme that is robust and stable when nodal elements are used [8].

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