

NUMERICAL APPROXIMATION OF THE TIME-HARMONIC MAXWELL SYSTEM USING
H1-CONFORMING FINITE ELEMENTS

Andrea Bonito

Texas AM University , USA

bonito@math.tamu.edu

We describe a new approximation technique for the Maxwell eigenvalue problem based on H1-conforming finite elements. While reviewing the relevant properties of the Maxwell operator, we point out the difficulties for H1-conforming finite element methods to produce correct spectral approximations. It turns out that the key idea consists of controlling the divergence of the electric field in a fractional Sobolev space with differentiability index between -1 and $-1/2$. To illustrate the essence of our method, we first examine a non-implementable scheme with this property. Its implementable version relying on a lagrange multiplier to impose such control on the divergence is then discussed. Finally, we examine the case of heterogeneous media. In this context the method needs to cope, in addition, with electric fields not much more than square integrable.