Abstracts

Synthesis of Vector Parasites in Finite Element Maxwell Solutions

Closed-form solutions to driven boundary value problems are obtained for the discrete finite element forms of the double-curl, penalty, and Helmholtz equations, as realized on simple C° bilinear elements. The solutions are expressed as a composite of physical and spurious vector modes, and are qualitatively similar to numerical solutions reported on more complex geometries. The findings reveal the critical role of discrete boundary conditions in determining the strength of the spurious modes; the overall superiority of the Helmholtz weak form; and the importance of proper boundary conditions for its successful use. In particular, one blend of normal and tangential conditions which appears well-posed is shown to be inappropriate; and a simple alternative is shown to work well.

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