Well-posedness and error estimates of a hybrid formulation for the eddy current problem

Jessika Camaño [*],   Rodolfo Rodriguez [†]

Abstract

We propose an alternative approach to introduce source current data in the eddy current problem formulated in terms of the electric field $\mathbf{E}_C$ in the conductor and the magnetic field $\mathbf{H}_I$ in the insulator. This extends previous results from [1], where the well-posedness of a similar hybrid formulation has been proved. However it is not clear how to prove thorough error estimates for the discretization of this approach. We propose an alternative auxiliary problem with suitable boundary conditions, which allows us to prove the solvability of the continuous problem and error estimates considering Nédélec finite elements to compute both, the electric and the magnetic field.

References

[1] Alonso-Rodríguez, A., Valli, A., *Eddy Current Approximation of Maxwell Equations: Theory, Algorithms and Applications.* Modeling, Simulation and Applications, Springer-Verlag Italia (2010)

[*]Departamento de Ingeniería Matemática, Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción, Casilla 160-C, Concepción, Chile, e-mail: `jcamano@ing-mat.udec.cl`

[†]CI²MA, Departamento de Ingeniería Matemática, Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción, Casilla 160-C, Concepción, Chile, e-mail: `rodolfo@ing-mat.udec.cl`