A NOVEL IMPLEMENTATION OF THE H-BASED FORMULATION OF THE EDDY CURRENT MODEL

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Abstract. Eddy current equations are a well-known approximation of Maxwell equations obtained by disregarding the displacement current term (see e.g., [2]). The typical setting for an eddy current problem distinguishes between a conducting region, Ω_C, and the surrounding non-conducting air region, Ω_I. The unknowns of the formulation based on the magnetic field can be reduced to the magnetic field in the conductor $\mathbf{H}_C$, the scalar magnetic potential ψ_I in the insulator and, if the insulator is not simply connected, the loop field $\boldsymbol{\rho}_I$, a curl-free vector field whose line integral on some loops contained in Ω_I is different from zero.

We present a novel implementation of the finite element approximation of the **H**-based formulation of the eddy current model that use an alternative procedure for the construction of a basis of the space of loop fields. The proposed method works for general topological configurations and does not need the determination of cutting surfaces (see e.g., [3]). The procedure is based on the explicit knowledge of a maximal set of non bounding cycles on the boundary of the insulator (see [4]), and use an explicit formula for expressing the discrete loop fields in terms of linking numbers (see [1]).

References

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