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NUMERICAL SOLUTION OF TRANSIENT NONLINEAR AXISYMMETRIC EDDY CURRENT MODELS WITH HYSTERESIS

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This work deals with the mathematical analysis and the computation of transient electromagnetic fields in nonlinear magnetic media with hysteresis. The results obtained complement those in [1, 2], where existence of the solution has been proved under fairly general assumptions on the **H**–**B** curve, namely, the nonlinear constitutive relation between the magnetic field **H** and the magnetic induction **B**. In our case, the constitutive relation between **H** and **B** is given by a hysteresis operator, i.e. the values of magnetic field not only depends on the present values of magnetic induction but also on the past history. Like in [1], we assume axisymmetry of the fields and then consider two kinds of boundary conditions. Firstly the magnetic field is given on the boundary (Dirichlet boundary condition). Secondly, the magnetic flux through a meridional plane is given, leading to a non-standard boundary-value problem. For both problems, under suitable assumptions, an existence result is achieved. The technique we use is based on implicit time discretization, a priori estimates and passage to the limit by compactness (see, for instance, [3] and [4]). Finally we consider an application: the numerical computation of eddy current losses in laminated media as those used in transformers or electric machines.

This is a joint work with Alfredo Bermúdez and M. Dolores Gómez (Universidad de Santiago de Compostela, España), and Rodolfo Rodríguez (Universidad de Concepción).

Referencias

[1] Bermúdez, A., Dolores Gómez, M., Rodríguez, R., Salgado, P. and Venegas, P., *Numerical solution of a transient non-linear axisymmetric eddy current model with non-local boundary conditions*. Math. Models Methods Appl. Sci., vol. 23, pp. 2495–2521, (2013).

[2] Bermúdez, A., Dolores Gómez, M., Rodríguez, R. and Venegas, P., *Numerical analysis of a transient non-linear axisymmetric eddy current model*. (submitted).

[3] M. Eleuteri, *An existence result for a P.D.E. with hysteresis, convection and a nonlinear boundary condition, Discrete Contin. Dyn. Syst.* Proceedings of the 6th AIMS International Conference, suppl. (2007) , pp. 344–353.

[4] A. Visintin, *Differential Models of Hysteresis*, Springer, 1994.