REGULARITY OF SOLUTIONS AND CONVERGENCE OF TIME-STEPPING FOR THE LANDAU-LIFSHITZ-GILBERT EQUATION

MICHAEL FEISCHL AND THANH TRAN

Abstract. We prove that the Landau-Lifshitz-Gilbert equation in three space dimensions with homogeneous Neumann boundary conditions admits arbitrarily smooth solutions, given that the initial data is sufficiently close to a constant function. This result serves as a fundation for The analysis of a numerical method for the coupled system of the eddy current equations in $\mathcal{R}^3$ with the Landau-Lifshitz-Gilbert equation in a bounded domain. The unbounded domain is discretized by means of finite-element/boundary-element coupling. Even though the considered problem is strongly nonlinear, the numerical approach is constructed such that only two linear systems per time step have to be solved. We prove existence of weak solutions and establish a priori error estimates if a sufficiently smooth strong solution exists.

Keywords: LLG, time-stepping, regularity

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Universtiy of Bonn
E-mail address: michael.feischl@uni-bonn.de

UNSW Sydney
E-mail address: thanh.tran@unsw.edu.au