

Analysis of Néel walls in thin ferromagnetic films

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We study a model for the magnetisation vector field in thin films of ferromagnetic materials. In a certain parameter regime, the magnetisation tends to be nearly constant in certain regions, which are separated by transition layers called Néel walls. We are interested in the stability of certain configurations of Néel walls and the interaction between them. We study these questions with variational considerations.

The underlying energy has superficial similarities to the Allen-Cahn functionals, but with an additional nonlocal contribution. Understanding the nonlocal term is the key to the analysis, and it turns out that the behaviour of Néel walls is much more similar to Ginzburg-Landau vortices than to Allen-Cahn phase transitions.

This is joint work with Radu Ignat (Université Paul Sabatier, Toulouse).