

Domain Branching in Micromagnetism

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Nonconvex variational problems regularized by higher-order terms have been used to describe many physical systems that exhibit microstructure formation. These problems can be naturally embedded in a whole family of problems of the form: minimize $E(u) = S(u) + N(u)$, where u belongs to an admissible class of functions that take only two values, say -1 and 1 . Here, $N(u)$ represents a nonlocal interaction that favors small-scale phase oscillations, while $S(u)$ is the interfacial energy that penalizes them. In this talk, I will present joint work with Tobias Ried, in which we establish scaling laws for the global and local energies of minimizers of an energy functional that naturally arises when analyzing the behavior of (strongly) uniaxial ferromagnets using the Landau-Lifschitz model. These scaling laws strongly suggest that minimizers have a self-similar behavior.

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