ANALYSIS SEMINAR, OCTOBER 10, 2011

The Γ-convergence of the energies and the convergence of almost minimizers in infinite magnetic wires.

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Abstract: We study static 180 degree domain walls in infinite thin magnetic wires with either a rectangular or a centrally symmetric Lipschitz cross section. In dependence of the thickness of the wire, different pattern formations of the magnetization vector are observed. We prove an existence of global minimizers (even for Lipschitz cross sections). We prove a ?-convergence result for both types of thin wires. For rectangular cross sections we distinguish two different regimes and establish the minimal energy scaling in terms of the cross section edge's lengths. For a centrally symmetric cross section we establish as well the minimal energy scaling in terms of the diameter of the cross section and some geometric parameters relating to it. We prove as well a rate of convergence for the minimal energies for all cases and an H^1 convergence for almost minimizers. For thick wires with a rectangular cross section we prove an upper bound and give a reference for a lower bound on the minimal energy. For thin wires a Nel wall occurs and for thick wires a vortex wall is expected to occur.