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Magnetic domains in ultrathin ferromagnetic films

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We present an asymptotic analysis of the micromagnetic energy in a ultrathin ferromagnetic material with strong uniaxial anisotropy and easy axis perpendicular to the film plane. For subcritical dipolar strenghts, we show that, in the limit, the energy renormalizes the perimeter. Moreover, for critical dipolar strenghts we identify the next order Γ-limit. Lastly, we will focus on establishing a similar result in the case of ultrathin ferromagnetic materials of finite spatial extent, where a specific regularization is needed in order to account for possible jump-discontinuities at the sample boundary, which would make the nonlocal part of the energy inifinite. This is based on a joint project in collaboration with C. B. Muratov and M. Novaga.

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