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Composite domain walls in flat nanomagnets: the dipolar limit[1] GIA-WEI CHERN, HYUN YOUK, KATHLEEN MERIT, OLEG TCHERNYSHYOV, Johns Hopkins University — Topological defects play an important role in nanoscale ferromagnets. We have previously demonstrated that domain walls in thin strips and rings are composite objects made of bulk vortices (winding numbers $n = \pm 1$) and edge defects (fractional winding numbers $n = \pm 1/2$) and given analytical solutions in the exchange limit [1]. Experimentally accessible systems are in the opposite regime where the dipolar interaction dominate. In this limit the vortex solution remains unchanged, the antivortex and antihalfvortex are deformed but survive, whereas the halfvortex acquires a high magnetostatic energy and becomes unstable. Accordingly, domain walls in this limit consist of two antihalfvortices and a vortex between them. We present a model of the domain wall in the magnetostatic limit in which the location of the vortex core is a variational parameter. As the width and thickness of a strip change, the global and local minima of the total magnetic energy yield the familiar transverse and vortex walls, as well as more exotic configurations such as the "diagonal wall" with a vortex hanging close to an edge. [1] O. Tchernyshyov and G.-W. Chern, Phys. Rev. Lett. **95**, 197204 (2005).

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