Magnetic skyrmions confined in a bounded domain

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Skyrmions are particle-like topological singularities present in some ultrathin ferromagnets under some specific conditions. Their presence can be explained by a specific contribution to the micromagnetic energy, namely the Dzyaloshinskii-Moriya interaction (DMI), which favors rotation of the magnetization vector. We will present a simple model where the presence of a single skyrmion is forced by a degree one condition, and the confinement in a given bounded domain is guaranteed by a constant Dirichlet condition on the boundary. When the DMI strength - tuned by a small parameter - tends to zero, we will see that the energy minimizers concentrate at a point whose position minimizes a renormalized energy that we can compute explicitly for some simple domains.

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