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. They can be modelled as minimizers or stable states of the micromagnetic energy with an additional term, namely the Dzyaloshinskii-Moriya interaction (DMI), which favors rotation of the magnetization vector. We will present a simple model using the exchange energy and the DMI term only in a bounded domain with constant Dirichlet boundary conditions and a degree 1 condition forcing the presence of a single isolated skyrmion. When the DMI strength – tuned by a small parameter – tends to zero, we will see that the energy minimizers concentrate on a point whose position minimizes a renormalized energy that we will compute in some examples.