The dynamics of vortices

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Ginzburg-Landau equations are nonlinear PDE arising in superconductivity and other areas of physics. The main qualitative feature of solutions of such equations is the presence of localized topological structures called vortices. For several evolution equations of Ginzburg-Landau type (with magnetic field present), we show that for appropriate initial data, solutions can be described, for long times, as a small perturbation of a collection of vortices. We also identify the dynamical system describing the motion of the vortex centres.