Small Vortex Clusters
in Bose-Einstein Condensates:
Theory and Experiments

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Motivated by recent experiments studying the dynamics of configurations bearing a small number of vortices in atomic Bose-Einstein condensates (BECs). We illustrate that, by considering these vortices as quasi-particles, such systems can be accurately described by reduced models of coupled ordinary differential equations on the vortex positions. We study in detail the dynamics and stability of vortex configurations bearing a small number of vortices in harmonically trapped BECs. Periodic and quasi-periodic solutions, and their stability, are studied and compared favorably with experimental observations. Symmetry-breaking bifurcations for regular vortex configurations are identified and matched to experimental observations. The case of increasingly large number of vortices and its coarse-grained continuum limit description is also considered.