On viscous vortex dipoles and crystals

Michele Dolce

The dynamics of point vortices in a two-dimensional inviscid fluid are described by the Helmholtz-Kirchhoff system, which admits numerous relative equilibria in specific configurations. However, at large but finite Reynolds numbers, diffusion leads to the growth of vortex cores. This eventually invalidates the point vortex approximation over long times and it reveals complex phenomena that remain the focus of active research in applied fluid dynamics.

This talk discusses recent mathematical advances in capturing both the quantitative and qualitative behavior of simple yet physically relevant vortex configurations. The goal is to highlight open research directions of interest from both theoretical and applied perspectives.

The results presented are based on joint work with T. Gallay and ongoing collaboration with M. Donati.