

Vortex dynamics and relative equilibria

Taoufik Hmidi

Université de Rennes II

The main goal of this mini-course is to discuss the emergence of self-organized structure in turbulent Hamiltonian flows. We shall in particular study some aspects of vortex motion for planar incompressible Euler equations. We start with analyzing different notions of solutions in the well-posedness problem. Second we shall explore the vortex patch problem and exhibit a large family of rotating patches moving without deformation and with different topological structures. The last part of this course will be devoted to recent results on rotating vortices with non-uniform profiles. The full description is given below:

1. Strong and weak solutions.
2. Vortex patches and boundary motion.
3. Relative equilibria.
4. Potential formulation and moving plane method.
5. Bifurcation theory and consequences.
6. Rotating vortices with non-uniform distributions.