DIFFERENTIAL GEOMETRY/PDE & DYNAMICAL SYSTEMS SEMINAR

Friday, December 17
Padelford C-401
1:30 pm
NOTE: Special day, time and room

Point vortices on the sphere

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The system of point vortices is a finite dimensional approximation to Euler's equations for the evolution of the vorticity of an ideal fluid. The vorticity is concentrated in a set of isolated points, and the model describes just the evolution of those points. While the system in the plane has been studied for over a century, beginning with work of Helmholtz and Kirkhoff. The system on the sphere has only begun to be studied fairly recently, motivated in some circles by possible applications to the movement of weather systems such as cyclones. I will talk about how one can use symmetry methods to obtain certain classes of solutions to this Hamiltonian dynamical system, namely relative equilibria or steadily rotating solutions. The symmetry involves both the rotations of the sphere, together with its associated conserved quantities, and the permutations of identical vortices.

The techniques I will discuss also have applications to other systems, such as the classical dynamics of molecules or other N-body systems.