1147-76-925 **Scott David Kelly*** (scott@kellyfish.net), Mechanical Engineering & Engineering Science, UNC Charlotte, 9201 University City Boulevard, Charlotte, NC 28223. *Hamiltonian vortex-body interactions, inviscid vortex shedding, and models for aquatic locomotion.*

The dynamic interaction of a free solid body with a collection of point vortices in a planar ideal fluid, or with a collection of closed vortex filaments in a three-dimensional ideal fluid, can be modeled by a system of ordinary differential equations exhibiting a noncanonical Hamiltonian structure reflecting the simultaneous conservation of momentum and circulation. Diverse nonlinear control problems can be obtained by allowing the shape of the body or its interior mass distribution to change over time in response to actuation. Idealized mechanisms for vortex shedding can be introduced to such systems through localized velocity constraints like the Kutta condition from classical aerodynamics, enabling the realization of reduced-order models for the self-propulsion of animals and robots in viscous fluids. This talk will survey the construction of such models and present numerical results representing a variety of problems in aquatic locomotion. (Received January 30, 2019)