Meeting: 998, Houston, Texas, SS 8A, Special Session on Dynamical Systems

998-58-353 **D. C. Offin*** (`offind@mast.queensu.ca`), Daniel Offin, Dept. Mathematics and Statistics, Queen's University, Kingston, Ontario K7L 3N6, Canada. *Lagrangian singularities and stability for periodic orbits in Hamiltonian systems.*

Given a Hamiltonian vector field X_H on T^*M, we consider the **invariant energy surface** $E_h = H^{-1}(h)$. The integral curves of X_H lying on E_h are extremals of the variational principle, $\Gamma \longrightarrow \int_\Gamma pdq$ where Γ is an arbitrary curve contained in E_h. We are interested particularly in periodic extremals. We assume that H is convex in the fibre.

Singularities of the projection $\pi : T^*M \to M$, occur when $d\pi|_{\mathcal{L}}$ is not surjective, for a Lagrangian submanifold $\mathcal{L} \subset T^*M$. Caustic singularities are particular Lagrangian singularities which occur along envelopes of projected extremals $\gamma = \pi\Gamma$ which foliate $\mathcal{L}$. For a nondegenerate periodic extremal γ, the corresponding Lagrangian manifold containing γ can be thought of the manifold of *periodic configuration variations*. We examine the beautiful relation between counting the Lagrangian singularities, and the linearized stability of Γ. We illustrate cases when this relation has a precise formulation. (Received March 02, 2004)