1044-34-2 **Anthony Michael Bloch***, Dept. of Mathematics, University of Michigan, 530 Church Street, Ann Arbor, MI 48103-1043. *Variational Principles and Nonholonomic Dynamics.*

In this work I consider variational and dissipative aspects of nonholonomic systems – systems with nonintegrable kinematic constraints. The dissipation encompasses external dissipation, including that induced from coupling to an external field, and natural internal dissipation where system energy is preserved but there is a contraction in the phase space. This contractive property can occur in nonholonomic systems, but is prohibited in Hamiltonian systems. Nonholonomic systems are in fact a natural generalization of Hamiltonian systems. An example of such a system is the Chaplygin sleigh – a sliding body where one support is a knife edge. I show how one can realize the nonholonomic constraint that arises in the Chaplygin sleigh problem by taking the limit of a suitable coupling to a wave field. This enables one to study the dynamics within the class of (infinite) Hamiltonian systems. This builds on earlier research work which shows how to represent the nonholonomic constraint as the limit of a certain kind of nonlinear Rayleigh dissipation.

I will present some of the background and history behind this set of ideas. (Received August 29, 2008)