

DIFFERENTIAL GEOMETRY/PDE SEMINAR

WEDNESDAY, NOVEMBER 3, 2004

PADEL FORD C-36

3:50 PM

Virtual Constraints and a Brachiating Robot

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This talk will discuss different aspects of controlling a brachiating robot. For such a robot, locomotion is achieved by swinging from one position to another, as an ape would do as it swings from one branch to another while traveling through trees. The model we consider for the brachiating robot is an underactuated mechanical system with two degrees of freedom – basically a double pendulum for which the motion is controlled by one torque on the interior joint angle. Approaches to controlling a brachiating robot range from heuristic learning methods, where no knowledge of the underlying dynamical system is required, to careful analysis's of the dynamical system. We will discuss some of these different approaches, and then introduce a new approach which uses the control to conserve a momentum like quantity, or equivalently impose a virtual constraint in the system. The techniques involved in this approach are based on analyzing the ordinary differential equations for the controlled mechanical system, exploiting symmetry in the problem, and establishing the existence of a conserved energy like quantity.

For more information about this seminar, visit the DG/PDE Seminar Web page (from the Math Department home page, www.math.washington.edu, follow the link **Seminars, Colloquia, and Conferences**).

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