

MATHEMATICS DEPARTMENT
North Carolina State University

JOINT NUMERICAL ANALYSIS/DIFFERENTIAL
EQUATIONS SEMINAR

Thursday, February 26, 2004
2:35 p.m. 330 Harrelson Hall

N. Harris McClamroch

Department of Aerospace Engineering
University of Michigan

**Variational integrators: A review, some new
results, and applications to the simulation
of a dumbbell body in space”**

Abstract

A review of the basic concepts of discrete Euler-Lagrange equations as variational integrators is given. Standard developments are used to obtain new algorithms for Lagrangian systems whose inertia metric depends on the configuration. Variational integrators are also developed for the reduced dynamics corresponding to a cyclic generalized coordinate. A dynamics model is presented for a dumbbell body in space in a central gravitational field; the model includes coupling between orbital dynamics, attitude dynamics, and shape dynamics. The value of variational integrators is illustrated by presenting simulation results for this space dynamics example.

Professor McClamroch is a former editor of IEEE Transactions on Automatic Control, and a past president of the IEEE Control Systems Society.

**Please note that the talk is on a Thursday.
Graduate students are invited to attend.**

Questions, comments, and offers to talk should be directed to Steve Schechter, 919-515-6533, schechter@math.ncsu.edu.