



McMaster University



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**THE FIELDS INSTITUTE
FOR RESEARCH IN MATHEMATICAL SCIENCES**

SEMINAR SERIES ON CONTROL THEORY

SPEAKER:

**PETER E. CROUCH
Arizona State University**

The First of Two Talks: Part I:

"Variational Characterization of Hamiltonian Input Output Systems"

will be held

Wednesday, March 25th, 1992 at 3:30 p.m.

at

**Fields Institute
3rd Floor, Uni-Park 3
185 Columbia Street West
Waterloo**

We are concerned with the class of Hamiltonian Input-Output Systems. We use realization theory to relate the internal state space representation to the external input-output representation. We consider three different representations of the input-output mapping generated by a state space system; a Volterra or generating series, an input-output differential equation, and a manifold of input-output function pairs. Hamiltonian systems are characterized in each representation by a distinctive structure which we describe. We make contact with the inverse problem of classical mechanics; when is a Newtonian system Lagrangian? Our work represents a natural generalization of this theory, in which the self adjointness of variational systems plays a central role. This is joint work with A. van der Schaft and F. Lamnabhi-Lagarrigue.