McMaster University   University of Toronto   University of Waterloo

THE FIELDS INSTITUTE
FOR RESEARCH IN MATHEMATICAL SCIENCES

SEMINAR SERIES ON CONTROL THEORY

SPEAKER:

> ### PETER E. CROUCH
> **Arizona State University**

The Second of Two Talks: Part II:

"Input-Output Characterization of Hamiltonian Input-Output Systems"

will be held

Friday, March 27th, 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 representaion. 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.