McMaster University   University of Toronto   University of Waterloo

THE FIELDS INSTITUTE FOR RESEARCH IN MATHEMATICAL SCIENCES

DIRECTOR'S SERIES

SPEAKER:

ELIZABETH BRADLEY
MIT
Artificial Intelligence Lab

On the Topic:

"Control Algorithms for Chaotic Systems"

Control algorithms that exploit chaotic behavior and its precursors to accomplish design goals can vastly improve the performance of many practical and useful systems. The program *Perfect Moment* is built around a collection of such techniques. Given a differential equation and two points in the system's state space, it automatically maps the space, chooses a set of trajectory segments from the maps, uses them to contruct a composite path between the points, and causes the system to follow that path by monitoring the state and switching parameter values at the segment junctions. Rules embodying theorems and definitions from nonlinear dynamics are used to limit complexity by directing and focusing the mapping and search on the areas of interest. Even so, these processes are computationally intensive. However, the sensitivity of a chaotic system's state-space topology to the parameters of its equations and the sensitivity of the paths of its trajectories to the initial conditions make this approach rewarding in spite of its computational demands. Controlled trajectories found by this program exhibit a variety of interesting and useful properties. For example, detours through chaotic regions can be used to steer trajectories across boundaries of basins of attraction, effectively altering both the geometry of and convergence properties within a particular convergence region.

Friday, September 25th, 1992 at 2:30pm, room 3018

at

The Fields Institute

(Uni-Park 3, 185 Columbia Street West, Waterloo)