STEVENS
Institute of Technology

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Hybrid Inclusions: A Framework for Modeling and Analysis of Hybrid Dynamical Systems

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4:00 pm
Peirce 120

Abstract:

Hybrid dynamical systems are systems that combine features of continuous-time dynamical systems and discrete-time dynamical systems. Examples include mechanical systems, where velocities change rapidly due to collisions; systems which switch between different modes of operation, like "on" and "off"; and control algorithms that rely on logic and resetting timers to control continuous-time systems.
Hybrid inclusions, which combine differential inclusions, difference inclusions, and constraints on motions resulting from the inclusions, provide a broad model of such systems. The lecture will present modeling capabilities of hybrid inclusions and give, under mild assumptions, several elements of asymptotic stability theory for hybrid inclusions. For example, robustness of asymptotic stability, existence of smooth Lyapunov functions, and approximation of a hybrid inclusion in the spirit of linearization will be discussed. The role of set-valued and variational analysis in hybrid inclusions theory will be underlined.

Rafal Goebel received the M.Sc. degree in mathematics in 1994 from the University of Maria Curie Sklodowska in Lublin, Poland, and his Ph.D. degree in mathematics in 2000 from University of Washington, Seattle. He held a postdoctoral position at the Departments of Mathematics at the University of British Columbia and Simon Fraser University in Vancouver, Canada, 2000 – 2002; a postdoctoral and part-time research positions at the Electrical and Computer Engineering Department at the University of California, Santa Barbara, 2002 – 2005; and a part-time teaching position at the Department of Mathematics at the University of Washington, 2004 – 2007. In 2008, he joined the Department of Mathematics and Statistics at Loyola University Chicago. He is the recipient of the 2009 SIAM Control and Systems Theory Prize. His interests include convex, nonsmooth, and set-valued analysis; control, including optimal control; hybrid dynamical systems; and optimization.

Refreshments will be provided.
For more information contact Darinka Dentcheva or call 201-216-5449.