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Information Science and Technology Center Seminar



Professor Alexandre Megretski
Department of Electrical Engineering & Computer Science
Massachusetts Institute of Technology

"Accounting for Robustness in Optimization-Based Identification of Nonlinear Models"

Wednesday, January 13, 2010

3:00 - 4:30 PM

TA-3, Bldg. 1690, Room 102 (CNLS Conference Room)

Abstract: System identification can be viewed as the search (typically by means of an optimization process) for simple equations explaining accurately the observed input-output behavior of a dynamical system. As a rule, achieving high fidelity with a low complexity model requires simultaneous optimization of its forward and feedback loops (in the case of a linear system, this would mean simultaneous optimization of both numerator and denominator of the transfer function). A major challenge in system identification is to incorporate a measure of stability (robustness) of the feedback loop into an overall data matching criterion, without making the resulting optimization problem intractable.

This talk describes the use of dissipation inequalities and convex relaxations in a nonlinear system identification framework which ensures proper (if somewhat conservative) accounting for robustness. Generalized passive models form a set which is both convex and universal (capable of approximating arbitrary stable causal dependencies). The convexity enables the use of semi-definite programming in the derivation of the identified model. Implementation examples and a discussion of alternatives will be given.

Biography: Alexandre Megretski got his Ph.D. in control theory in 1988 from Leningrad University, USSR. He was a researcher at the Royal Institute of Technology (Sweden), University of Newcastle (Australia), and a faculty member at Iowa State University. He is now a professor of Electrical Engineering at MIT, working on nonlinear systems (analysis, identification, model reduction, and design) and optimization.



Contact the technical host Garrett Kenyon, gkenyon@lanl.gov, 667-1900 or the institutional host Frank Alexander, fja@lanl.gov, 665-4518 for further information.

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