



Washington University in St. Louis

SCHOOL OF ENGINEERING & APPLIED SCIENCE

Preston M. Green Department of Electrical & Systems Engineering

Seminar Announcement

Miroslav Krstic, Ph.D.

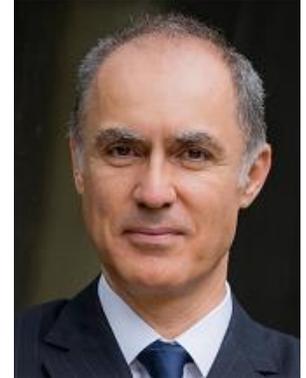
Sr. Associate Vice Chancellor for Research

Director, Cymer Center for Control Systems and Dynamics

Daniel L. Alspach Endowed Chair in Dynamic Systems and Control

Distinguished Professor of Mechanical and Aerospace Engineering

University of California, San Diego



Thursday, February 22, 2019

Green Hall, Room 0120

10:00 A.M.

Regulation-Triggered Adaptive Control

Abstract:

Adaptive control has been in existence for about six decades. One property that has eluded conventional adaptive controllers is exponential regulation with a rate independent of the initial condition. I started my career in the early 1990s by generalizing such controllers from linear to nonlinear systems. Nearly a quarter century later I return to that topic but using a new approach to designing the parameter estimator, the approach of regulation-triggered batch identification. In plain terms, non-recursive identification is applied over intervals of time over which the parameter estimate is held constant and, only when the regulation error gets “too large,” a parameter estimate update is “triggered,” generating a new estimate from the batch of measurements since the last update. While this approach does not achieve anything that is known to be impossible - namely, in the absence of persistent excitation, the parameter estimate does not converge to the true value - the parameter estimator provably stops updating in finite time, which then results in uniform exponential regulation. I present a general design for nonlinear systems, an aerospace engineering example (the “wing rock” instability), and an extension to a PDE problem. This is joint work with Iason Karafyllis from the Mathematics Department of the National Technical University of Athens.

Miroslav Krstic is Distinguished Professor of Mechanical and Aerospace Engineering, holds the Alspach endowed chair, and is the founding director of the Cymer Center for Control Systems and Dynamics at UC San Diego. He also serves as Senior Associate Vice Chancellor for Research at UCSD. As a graduate student, Krstic won the UC Santa Barbara best dissertation award and student best paper awards at CDC and ACC. Krstic has been elected Fellow of seven scientific societies - IEEE, IFAC, ASME, SIAM, AAAS, IET (UK), and AIAA (Assoc. Fellow) - and as a foreign member of the Serbian Academy of Sciences and Arts and of the Academy of Engineering of Serbia. He has received the SIAM Reid Prize, ASME Oldenburger Medal, Nyquist Lecture Prize, Paynter Outstanding Investigator Award, Ragazzini Education Award, Chestnut textbook prize, Control Systems Society Distinguished Member Award, the PECASE, NSF Career, and ONR Young Investigator awards, the Axelby and Schuck paper prizes, and the first UCSD Research Award given to an engineer. Krstic has also been awarded the Springer Visiting Professorship at UC Berkeley, the Distinguished Visiting Fellowship of the Royal Academy of Engineering, and the Invitation Fellowship of the Japan Society for the Promotion of Science. He serves as Editor-in-Chief of Systems & Control Letters and has been serving as Senior Editor in Automatica and IEEE Transactions on Automatic Control, as editor of two Springer book series, and has served as Vice President for Technical Activities of the IEEE Control Systems Society and as chair of the IEEE CSS Fellow Committee. Krstic has coauthored thirteen books on adaptive, nonlinear, and stochastic control, extremum seeking, control of PDE systems including turbulent flows, and control of delay systems.