

ECEE Department Seminar Spring 2010



Tuesday, February 9
3:30pm, ECCR 265



REACT – Robust Estimation for Automatic Controller Tuning

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For most control systems, performance can be quantified by the variance of a system dependent or user defined control System Performance Signal (SPS). The smaller the variance of the SPS, the better is the performance of the control system. However, the variance of the SPS may be determined by both period and non-repeatable disturbances for which the characteristics are often not known a-priori during the control design. In this presentation it is shown how an existing control algorithm can be augmented with an additional feedback loop that can be tuned automatically by estimating the actual disturbance spectra seen in a system dependent or user defined SPS. Adaptation to the disturbance spectra is done in lieu of possible model uncertainties in the plant model, guaranteeing stability robustness. As such, the control algorithm provides a Robust Estimation and Adaptive Controller Tuning (REACT) to disturbance spectra to maximize control performance by minimizing SPS variance in a high performance control systems. The approach will be illustrated on a high bandwidth servo system and an active noise control problem.



Raymond de Callafon is an Associate Professor with the Department of Mechanical and Aerospace Engineering (MAE) at the University of California, San Diego (UCSD). His research interests include topics in the field of experiment-based approximation modeling, control relevant system identification and recursive/adaptive control. In particular, he is interested in designing and analyzing experiment-based modeling techniques for control relevant identification of linear systems and extending these techniques to specific classes of (block) non-linear and linear parameter varying (LPV) systems. Newly developed model estimation techniques of Raymond de Callafon have been applied to structural damage detection problems, model or controller complexity reduction and (adaptive) feedback tuning in active noise and vibration control for high precision data storage systems and aero(servo)elastic systems for flutter prediction and control.

Raymond de Callafon received his M.Sc. (1992) and his Ph.D. (1998) degrees in Mechanical Engineering from the Delft University of Technology in the Netherlands and moved to San Diego for a postdoctoral position in 1998 with the Structural Systems and Control Laboratory of Prof. Skelton at the Dept. of MAE. During 1998 he also started as a Assistant Professor with the Dept. of MAE and he is currently directing the System Identification and Control Laboratory (SICL) and is an affiliated faculty of the Center for Magnetic Recording Research (CMRR) directing the CMRR servo laboratory. He has also created a new Under Graduate Control Laboratory (UGCL).

Light refreshments will be served.