Kolloquium Technische Kybernetik

Observers with strong convergence properties and some applications

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Abstract

Despite of the fact that the (global and instantaneous) observability property implies that the state of a system can be recovered in an arbitrarily small time (for every state) and the unknown input observability that this can be achieved despite of non vanishing perturbations, the usual smooth observers are able to provide an estimation of the states that converges only asymptotically and that it is only practically convergent in the presence of uncertainties or persistent perturbations.
In order to achieve the desired properties of convergence in finite time, robustness against persistent perturbations and convergence time independent of the initial conditions, it is necessary to provide the observer with strong nonlinearities, i.e. discontinuities and not globally Lipschitz nonlinearities. In the talk some recent developments in this direction will be presented and the results will be illustrated by means of some applications.

Biographical Information

Jaime A. Moreno received his PhD degree (Summa cum Laude) in Electrical Engineering (Automatic Control) from the Universität der Bundeswehr-Hamburg, Hamburg, Germany in 1995. The Diplom-Degree in Electrical Engineering (Automatic Control) from the Universität zu Karlsruhe, Karlsruhe, Germany in 1990, and the Licentiate-Degree (with honors) in Electronic Engineering from the Universidad Pontificia Bolivariana, Medellin, Colombia in 1987. He is full Professor of Automatic Control and the Head of the Electrical and Computing Department at the Institute of Engineering from the National University of Mexico (UNAM), in Mexico City. From 2008 until 2011 he was the Chair of the IFAC Technical Committee "Bioprocesses and Biosystems". He is the author and editor of 8 books, 3 book chapters, 1 patent, and author and co-author of more than 230 papers in refereed journals and conference proceedings. He spent a sabbatical year at the University of Stuttgart from August 2003 to August 2004. His current research interests include robust and non-linear control with application to biochemical processes (wastewater treatment processes), and the design of nonlinear observers.