

Controlled Synchronisation and Tracking Control for Piecewise Affine Systems

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Abstract:

In this seminar, the controlled synchronisation problem for continuous piecewise affine (PWA) systems is addressed. Due to the switching nature of these systems, strategies common for controlled synchronisation can not be used. Here, an observer-based output-feedback control design solving the master-slave synchronisation problem for two PWA systems is proposed. The design of these dynamic controllers is based on the idea of, on the one hand, rendering the slave system convergent by means of feedback (which makes all its solutions converge to each other) and, on the other hand, guaranteeing that the closed-loop slave system has a bounded solution corresponding to zero synchronisation error. This implies that all solutions of the closed-loop slave system converge to this bounded solution with zero synchronisation error. The results are illustrated by application to a master-slave synchronisation problem of two mechanical systems with one-sided restoring characteristics. Next, it will be illustrated that a similar convergence-based control design can be readily exploited to solve the state tracking and output tracking problem for PWA systems.

About the Speaker:

Nathan van de Wouw (born, 1970, The Netherlands) obtained his MSc-degree and PhD-degree in Mechanical Engineering from the Eindhoven University of Technology, Eindhoven, the Netherlands, in 1994 and 1999, respectively. From 1999 until now he has been affiliated with the Department of Mechanical Engineering of the Eindhoven University of Technology in the group of Dynamics and Control as an assistant professor. In 2000, Nathan van de Wouw was working with Philips Applied Technologies, Eindhoven, The Netherlands, and, in 2001, he was working with the Netherlands Organisation for Applied Scientific Research (TNO), Delft, The Netherlands. Currently, he is a visiting researcher with Joao Hespanha at UCSB until February 2007.

Recently he published the book 'Uniform Output Regulation of Nonlinear Systems: A Convergent Dynamics Approach' with A.V. Pavlov and H. Nijmeijer (Birkhauser, 2005). His current research interests are the analysis and control of non-smooth systems and networked control systems.
