Online Seminar Series for IFAC TC 1.2 Adaptive & Learning Systems
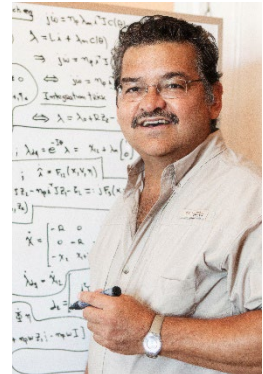
Organizers: Tiago Roux Oliveira, State University of Rio de Janeiro – UERJ, TC 1.2 Chair
Bing Chu, University of Southampton, TC 1.2 Vice-Chair for Social Media

Details of the Seminar

Title: New Robust Parameter Estimators and Systems Reparameterizations: Dealing with Lack of Excitation and Nonlinear Parameterizations

Speaker: Professor Romeo Ortega, Instituto Tecnológico Autónomo de México

Time: September 26, 2023 (11am CDT, 4pm UTC)

Abstract: In this talk we present some recent results on (i) robust parameter estimation without persistent excitation (PE) and (ii) new reparameterizations of nonlinearly parameterized (NLP) systems. After discussing the motivation to relax the PE assumption, we show how the recently introduced dynamic regressor extension and mixing estimator achieves this objective. Moreover, it allows us to consider, separable, NLP that satisfy an easily verifiable monotonizability property and improves, in a quantitative way, the transient performance of the estimator. In the second part of the talk we discuss some new techniques to deal with the highly complicated---but, alas, often encountered in applications---non-separable NLP. We concentrate our attention on the case of NLP of the form $e^{\theta_i h_i(t)}$, which is very common in physical systems. In the third part of the talk, we show that for nonlinear dissipative systems it is possible to derive an alternative parameterization, which is much simpler than the one usually derived directly from the system dynamic equations. Finally, we present some challenges in adaptive systems theory and survey some new theoretical results aimed at solving them.

Bio: Romeo Ortega was born in Mexico. He obtained his BSc in Electrical and Mechanical Engineering from the National University of Mexico, Master of Engineering from Polytechnical Institute of Leningrad, USSR, and the Docteur D`Etat from the Polytechnical Institute of Grenoble, France in 1974, 1978 and 1984 respectively.

He then joined the National University of Mexico, where he worked until 1989. He was a Visiting Professor at the University of Illinois in 1987-88 and at McGill University in 1991-1992, and a Fellow of the Japan Society for Promotion of Science in 1990-1991. He was a member of the French National Research Council (CNRS) from June 1992 to July 2020, where he was a "Directeur de Recherche" in the Laboratoire de Signaux et Systemes (CentraleSupelec) in Gif-sur-Yvette, France. Currently, he is a full time Professor at ITAM in Mexico and a Distinguished Professor of ITMO University in Russia. His research interests are in the fields of nonlinear and adaptive control, with special emphasis on applications.

Dr Ortega has published five books and more than 385 scientific papers in international journals, with an h-index of 95. He has supervised more than 35 PhD thesis. He is a Fellow Member of the IEEE since 1999 (Life 2020) and an IFAC Fellow since 2016. He has served as chairman in several IFAC and IEEE committees and participated in various editorial boards of international journals. He is currently Editor in Chief of Int. J. Adaptive Control and Signal Processing and Senior Editor of Asian Journal of Control.

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