



Resilient Distributed Average Consensus in the Presence of Network Uncertainty and Adversarial Conditions

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Abstract: Recent developments in digital system and networking technologies have led to the emergence of complex systems that need to be managed/controlled in a distributed manner over cyber infrastructures, such as wireless and wired broadband networks. The emergence of this type of network control systems, which range from smart grids and traffic networks of various sorts, to embedded electronic devices and robotic networks, has sparked huge interest in distributed control and coordination problems. In this talk, we present some recent progress in this area by focusing on an operation that is key for several such tasks: the distributed computation of the average (more generally, a weighted linear combination) of various parameters held at different components of a multi-component system. We discuss challenges pertaining to convergence, uncertainty about the network topology, and adversarial network conditions, such as communication delays, packet drops, and faulty/malicious nodes. Several examples and applications are also presented.

Biography: Christoforos Hadjicostis is Professor of Electrical and Computer Engineering at the University of Cyprus. He received S.B. degrees in Electrical Engineering, in Computer Science and Engineering, and in Mathematics, the M.Eng. degree in Electrical Engineering and Computer Science in 1995, and the Ph.D. degree in Electrical Engineering and Computer Science in 1999, all from the Massachusetts Institute of Technology, Cambridge, MA. In 1999, he joined the Faculty at the University of Illinois at Urbana-Champaign, where he served as Assistant and then Associate Professor with the Department of Electrical and Computer Engineering, the Coordinated Science Laboratory, and the Information Trust Institute. Since 2007, he has been with the University of Cyprus, where he has spent terms as Chair of the Department of Electrical and Computer Engineering (2008-2010) and as Dean of Engineering (2014-2017), and is currently serving as Interim Director of the FOSS Research Center on Sustainable Energy. His research focuses on fault diagnosis and tolerance in distributed dynamic systems; monitoring, diagnosis and control of large-scale discrete event systems; error control coding; and applications to energy distribution systems, network security, and anomaly detection. Dr. Hadjicostis is Editor-in-Chief of the Journal of Discrete Event Dynamic Systems. In the past, he served as Associate Editor of Automatica, IEEE Transactions on Automatic Control, IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Control Systems Technology, IEEE Transactions on Circuits and Systems I, and the Journal of Nonlinear Analysis of Hybrid Systems. He is an IEEE Fellow for contributions to distributed and discrete event systems.