

講演会のご案内

On Cross-Dimensional Dynamic Systems & Set Controllability of Boolean Networks with Applications

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日付: 2018年04月02日 14:00~15:30

場所: KH423室

TOPIC 1: On Cross-Dimensional Dynamic Systems

ABSTRACT: Cross-dynamic systems have various of scientific and engineering backgrounds, such as insect population dynamics, spacecraft docking/undocking, power generator modeling, superstring, etc.

Under the semi-tensor product (STP, or MM-product) of matrices, the set of matrices (M) with arbitrary dimensions becomes a monoid (semi-group with identity). The set of vectors (V) with arbitrary dimensions is considered as the state space of cross-dimensional dynamic systems. The action of M on V is proposed as the MV-product, which satisfies the requirement of S-system.

Define a (generalized) inner product on V , which provides a topological structure on V . Then the action becomes a cross-dimensional linear system. The following problems are discussed in this talk: (1) calculation of trajectories of cross-dimensional systems; (2) modeling of cross-dimensional control systems; (3) projection of a dynamic system of higher dimension onto a lower dimensional vector space; (4) some further topics.

TOPIC 2: Set Controllability of Boolean Networks with Applications

ABSTRACT: Set controllability of Boolean networks has been formulated and a necessary and sufficient condition is obtained. Using it, the following problems have been considered:

(1) observability of Boolean networks; (2) output controllability; (3) set stabilization; (4) controllability via mixed controls. All the problems are first converted into the corresponding set controllability problems, and then the corresponding necessary and sufficient conditions are obtained. The results show that set controllability is a power tool for investigating Boolean control problems.

BIOGRAPHY OF DAIZHAN CHENG

Dr. Daizhan Cheng graduated from Tsinghua University in 1970, received M.S. from Graduate School, Chinese Academy of Sciences in 1981, and Ph.D. from Washington University, St. Louis, in 1985. Since 1990, he is a professor with Institute of Systems Science, AMSS, Chinese Academy of Sciences. His research interests include nonlinear control systems, switched systems, Hamiltonian systems, Boolean control networks, and game theory. He is the author/coauthor of 14 Books, over 250 Journal Papers and over 150 Conference Papers. He was Chairman of Technical Committee on Control Theory, Chinese Association of Automation (2003-2010), member of IEEE CSS Board of Governors (2009, 2015), and IFAC Council Member (2011-2014). He is IEEE Fellow (2006-), IFAC Fellow (2008-). He received Second National Natural Science Award twice (in 2008 and 2014), Outstanding Science and Technology Achievement Price of CAS (2016), and the Automatica Best Methodology/Theory Paper Award (2008-2010), bestowed by IFAC.

