数学与系统科学研究院学术报告

报告题目：Modeling and control of distribution networks

报 告 人：Arjan van der Schaft (University of Groningen)

时间地点：4月11日 上午10:00-11:00, Room 210, 南楼

摘要：

Large-scale distribution networks arise in many application areas. Network flow theory often tends to focus on the static throughput behavior, without taking the dynamical storage phenomena into full account. In this talk we will describe a general port-Hamiltonian framework for describing and analyzing the dynamical properties of distribution networks and other physical network dynamics. This framework is rooted in classical theory of electrical circuits and mechanical networks, while emphasizing open systems. We will furthermore establish close similarities with consensus dynamics of multi-agent systems.

As a particular type of dynamical distribution networks we will focus on chemical reaction networks, motivated by ongoing collaboration in systems biology. We derive a compact formulation that is exhibiting at the same time the structure of the graph of the chemical complexes and the stoichiometry of the network. This formulation allows us to provide a surprisingly easy characterization of the set of equilibria or steady states, and their stability properties. In the final part of the talk we will discus ongoing recent work with regard to structure-preserving model reduction of large-scale physical networks, based on the notions of Kron reduction and clustering.

报告人简介及联系方式：

A.J. (Arjan) van der Schaft (1955) received the undergraduate and Ph.D. degrees in Mathematics from the University of Groningen, The Netherlands, in 1979 and 1983, respectively. In 1982 he joined the Department of Applied Mathematics, University of Twente, Enschede, where he was appointed as a full professor in Mathematical Systems and Control Theory in 2000. In September 2005 he returned to Groningen as a full professor in Mathematics.

He has served as Associate Editor for Systems & Control Letters, Journal of Nonlinear Science, SIAM Journal on Control and Optimization, and the IEEE Transactions on Automatic Control. Currently he is Associate Editor for the Journal of Geometric Mechanics, and Editor-at-Large for the European Journal of Control.

Arjan van der Schaft is Fellow of the Institute of Electrical and Electronics Engineers (IEEE), and Invited Lecturer at the International Congress of Mathematicians, Madrid, Spain, 2006.

He is a member of the Groningen Center for Systems and Control: http://www.math.rug.nl/gcsc/index.html.