数学与系统科学研究院学术报告

报告题目： Input-to-state stability in hybrid dynamical systems

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时间地点： 2007 年 7 月 24 日上午 10: 00—11: 00，思源楼 405

摘要： The input-to-state stability (ISS) property, introduced by Sontag in the late 1980's, has proved instrumental over the years as a guiding force behind the development of robust nonlinear control algorithms. Both in continuous time and discrete time, equivalent characterizations of ISS have been given to deepen our understanding of this important property for dynamical systems with exogenous inputs.

Over the last decade or more, nonlinear control designers have started to make use of logic variables in nonlinear control algorithms, giving rise to closed-loop dynamical systems that are "hybrid" in nature. By this one means that the closed-loop variables both flow continuously and make (discontinuous) jumps. Moreover, nonlinear control has branched out to address control of dynamical systems that are, themselves, hybrid perhaps due to impact collisions that cause jumps in variables like velocity.

In light of these developments, it has become increasingly useful to understand the ISS property for hybrid dynamical systems with exogenous inputs. In this talk, we will discuss ISS for hybrid systems, showing howit can be useful in the design of hybrid control systems, giving a variety of equivalent characterizations, and giving counterexamples to some other characterizations that are equivalent in continuous and/or discrete-time systems.

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Andrew R. Teel received his A.B. degree in Engineering Sciences from Dartmouth College in Hanover, New Hampshire, in 1987, and his M.S. and Ph.D. degrees in Electrical Engineering from the University of California, Berkeley, in 1989 and 1992, respectively. After receiving his Ph.D., Dr. Teel was a postdoctoral fellow at the Ecole des Mines de Paris in Fontainebleau, France. In September of 1992 he joined the faculty of the Electrical Engineering Department at the University of Minnesota where he was an assistant professor until September of 1997. In 1997, Dr. Teel joined the faculty of the Electrical and Computer Engineering Department at the University of California, Santa Barbara, where he is currently a professor. Professor Teel has received NSF Research Initiation and CAREER Awards, the 1998 IEEE Leon K. Kirchmayer Prize Paper Award, the 1998 George S. Axelby Outstanding Paper Award, and was the recipient of the first SIAM Control and Systems Theory Prize in 1998. He was also the recipient of the 1999 Donald P. Eckman Award and the 2001 O. Hugo Schuck Best Paper Award, both given by the American Automatic Control Council. He is a Fellow of the IEEE.

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