上海交通大学自动化系
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Key Laboratory of System Control and Information Processing, Ministry of Education

# 学术报告会

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## Control Design and Analysis for Underactuated Robotic Systems: Theory and Experimental Validation


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**Abstract:**

Underactuation is a technical term used in robotics and control theory to describe mechanical devices that have a lower number of actuators than degrees of freedom. The study of design and control for underactuated robotic systems (URSs) is a fertile research area having fruitful interactions with control and robotics and has attracted many researchers from both control and robotics communities. This talk presents a unified treatment of control design and analysis for a class of URSs we studied for more than a decade, which include systems with multiple-degree-of-freedom and/or with underactuation degree two. This talk presents some new notions, features, design techniques, and strictly global motion analysis results for these systems. These new materials are shown to be vital in studying the control design and stability analysis of URSs. The theoretical developments are validated by experimental results for several systems. It is expected that this talk will not only enable the listener to gain a better understanding of the power and fundamental limitations of linear and nonlinear control theory for the control design and analysis for these URSs, but also inspire the listener to address the challenges of more complex URSs.


**Biography:**

**Xin Xin** received the B.S. degree in 1987 from the University of Science and Technology of China, Hefei, China, and Ph.D. in 1993 from the Southeast University, Nanjing, China. From 1991 to 1993, he did his Ph.D. studies in Osaka University as a co-advised student of China and Japan with the Japanese Government Scholarship. He also received the Doctor degree in engineering in 2000 from Tokyo Institute of Technology. From 1993 to 1995, he was a postdoctoral researcher and then became an associate professor of Southeast University. From 1996 to 1997, he was with the New Energy and Industrial Technology Development, Japan as an advanced industrial technology researcher. From 1997 to 2000, he was an assistant professor of Tokyo Institute of Technology. From 2000, he has been with Okayama Prefectural University as an associate professor, where he is now a professor since 2008. He has over 170 publications in journals, international conferences and book chapters. He received the division paper award of SICE 3rd Annual Conference on Control Systems in 2004. His current research interests include robotics, dynamics and control of nonlinear and complex systems.