



江苏省应用数学科学研究中心 国际前沿学术论坛

International Frontier Academic Forum of Jiangsu Provincial
Scientific Research Center of Applied Mathematics

程序册 Program

主办 / Organizer

江苏省应用数学科学研究中心

Jiangsu Provincial Scientific Research Center of Applied Mathematics

承办 / Co-organizer

东南大学自组织移动系统实验室

Self-Organizing Mobility Lab (SOMLab), Southeast University

2026年5月15日 星期五

May 15, Friday, 2026

东南大学九龙湖校区文科综合大楼5楼咏曼报告厅

Yongman Lecture Hall, Jiulonghu Campus,
Southeast University



江苏省应用数学科学研究中心国际前沿学术论坛

International Frontier Academic Forum of Jiangsu Provincial
Scientific Research Center of Applied Mathematics



会议时间地点 / Time, address

2026年5月15日 (星期五) 8: 30-12: 00

2026, May 15, Friday 8:30 AM–12:00 PM

东南大学九龙湖校区综合大楼咏曼报告厅

Yongman Lecture Hall, Southeast University

会议议程 / Schedule

开幕式 / Open Ceremony

时间/time	活动内容/Activity outline	主持人/Host
8:30-8:40	中心特聘科学家Alessandro Astolfi教授致欢迎辞 Welcome Address by Prof. Alessandro Astolfi	刘娣教授 Prof. Di Liu Founder of Self-Organizing Mobility Lab (SOMLab)
	江苏省应用数学科学研究中心主任虞文武教授介绍研究中心发展概况 Applied Mathematics Center Overview by Prof. Wenwu Yu	

学术论坛 / Academic Forum

时间/time	报告题目/Title	报告人/Speaker	主持人/Host
8:40-9:25	Convergence of Adaptive MPC	郭雷院士 Prof. Lei Guo 中科院数学与系统科学研究院 Academy of Mathematics and Systems Science, CAS	陈关荣教授 Prof. Guanrong Chen 香港城市大学 City University of Hong Kong
9:25-10:10	Modeling, Estimation, and Control of Social Opinion Systems	Prof. Karl H. Johansson 瑞典皇家理工学院 KTH Royal Institute of Technology	Prof. Alessandro Astolfi 帝国理工学院 Imperial College & KAUST
10:10-10:40	茶歇&实验室参观 / Coffee Break & Lab Tour		
10:40-11:20	Optimal Filtering for Linear and Nonlinear Systems	Prof. Alessandro Astolfi 帝国理工学院 Imperial College & KAUST	余星火教授 Prof. Xinghuo Yu 墨尔本皇家理工学院 RMIT University
11:20-12:00	Can Simple Controllers Achieve Robust Prescribed Performance for Uncertain Nonlinear Systems?	Prof. George A. Rovithakis 亚里士多德大学 Aristotle University of Thessaloniki	温长云教授 Prof Changyun Wen 新加坡南洋理工大学 Nanyang Technological University



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Convergence of Adaptive MPC

2026, May 15, Friday 8:40 AM–9:25 AM

东南大学九龙湖校区综合大楼咏曼报告厅

主讲人 / Speaker



Lei Guo received his Bachelor's degree in Mathematics from Shandong University in 1982 and his Ph.D. in Control Theory from the Chinese Academy of Sciences (CAS) in 1987. He is currently a professor at the Academy of Mathematics and Systems Science, CAS, and serves as the director of the National Center for Mathematics and Interdisciplinary Sciences, CAS. He is a Fellow of IEEE, a Member of CAS, a Fellow of The World Academy of Sciences (TWAS), a Foreign Member of the Royal Swedish Academy of Engineering Sciences, and a Fellow of IFAC. He was awarded the IFAC Congress Young Author Prize in 1993, the IFAC Outstanding Service Award in 2011, an honorary doctorate from the Royal Institute of Technology (KTH, Sweden) in 2014, and the Hendrik W. Bode Lecture Prize from the IEEE Control Systems Society (CSS) in 2019. He has served as President of the Asian Control Association (ACA), President of the China Society for Industrial and Applied Mathematics (CSIAM), General Co-Chair of the 48th IEEE CDC, and Distinguished Lecturer of both IFAC and IEEE-CSS. His research interests include stochastic systems, system identification, machine adaptive control, adaptive game theory, control of uncertain nonlinear systems, feedback capability, multi-agent systems, and game-based control systems.

郭雷，1982年毕业于山东大学数学系，1982年至1987年在中国科学院系统科学研究所攻读硕士和博士学位，1987年至1989年在澳大利亚国立大学从事博士后研究。1992年2月被中国科学院特批为研究员，曾任中国科学院系统科学研究所所长、中国科学院系统控制重点实验室主任、中国科学院数学与系统科学研究院院长等职。2001年当选为中国科学院院士，2002年当选发展中国家科学院（TWAS）院士，IEEE Fellow，IFAC Fellow，瑞典皇家工程科学院外籍院士。2010年至今任中国科学院国家数学与交叉科学中心主任，现任中国科学院信息技术科学部主任、中国科学院学术委员会委员、中国科学院学部主席团成员。曾获1993年 IFAC 世界大会青年作者奖，2011年获 IFAC 杰出服务奖；2018年获苏步青应用数学奖；2019年获 IEEE 控制系统学会 Hendrik W. Bode Lecture Prize，2024年获亚洲控制协会杰出贡献奖，中国十大杰出青年、首届国家杰出青年科学基金、中国青年科学家奖、中国青年五四奖章、中国科学院自然科学奖、国家自然科学奖等重要奖励与荣誉，他曾任亚洲控制协会主席、中国工业与应用数学会理事长、中国数学会副理事长、中国自动化学会副理事长、第48届 IEEE CDC 共同主席、第8届国际工业与应用数学大会主席，并先后担任IEEE CSS 和 IFAC Distinguished Lecturer。主要研究方向：随机系统、系统辨识、机器学习、自适应控制、自适应滤波、自适应博弈论、不确定非线性系统控制、反馈能力、多智能体系统、基于博弈的控制系统。

内容简介 / Abstract

We will discuss the convergence of an adaptive model predictive control (MPC) algorithm for discrete-time linear stochastic systems with unknown parameters. The proposed adaptive MPC is designed by solving a finite horizon constrained linear-quadratic optimal control problem of online estimated models, which are built on the weighted least-squares (WLS) estimates modified by both the random regularization and attenuating excitation methods introduced earlier in stochastic adaptive control. By using the Markov chain ergodic theory, it is shown that the adaptive MPC performance will converge asymptotically to the ergodic MPC performance with known parameters.

主持人 / Host

Guanrong Chen received his Master's degree in Computational Mathematics from Sun Yat-sen University in Guangzhou in 1981, and his Ph.D. in Applied Mathematics from Texas A&M University in the United States in 1987. Subsequently, he served on the faculty at Rice University and the University of Houston. Since 2000, he has held the position of Chair Professor at the City University of Hong Kong, where he continues to serve to this day. Professor Chen was elected an IEEE Fellow in 1997; he received the Second Prize of the National Natural Science Award in 2008, 2012, and 2016, respectively. In 2011, he was awarded an honorary doctorate by Saint Petersburg State University in Russia and the Euler Gold Medal by the Euler Foundation of Russia. In 2014, he received an honorary doctorate from the University of Normandy in France and was elected a Member of the Academia Europaea. In 2015, he was elected a Member of the European Academy of Engineering and a Member of The World Academy of Sciences (TWAS).



陈关荣教授，1981年于广州中山大学获计算数学硕士学位，1987年于美国得克萨斯农工大学获应用数学博士学位。毕业后曾任教于莱斯大学与休斯顿大学。2000年起至今，担任香港城市大学讲座教授。陈教授1997年当选IEEE会士；先后于2008年、2012年、2016年三度荣获国家自然科学奖二等奖。2011年，获俄罗斯圣彼得堡国立大学荣誉博士学位、俄罗斯欧拉基金会欧拉金质奖章。2014年，获法国诺曼底大学荣誉博士学位，并当选欧洲科学院院士。2015年，当选欧洲工程院院士、世界科学院（TWAS）院士。



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Modeling, Estimation, and Control of Social Opinion Systems

2026, May 15, Friday 9:25 AM–10:10 AM

东南大学九龙湖校区综合大楼咏曼报告厅

主讲人 / Speaker



Karl H. Johansson is Swedish Research Council Distinguished Professor in Electrical Engineering and Computer Science at KTH Royal Institute of Technology, and Founding Director of Digital Futures. He holds an MSc in Electrical Engineering and a PhD in Automatic Control from Lund University, with visiting positions at UC Berkeley, Caltech and other institutions. His research focuses on networked control systems and cyber-physical systems, applied in transportation, energy, and automation networks. For his contributions, he has received numerous best paper awards and honors from IEEE, IFAC and others, including Distinguished Professor (Swedish Research Council), Wallenberg Scholar, Future Research Leader, IFAC Young Author Prize and IEEE CSS Hendrik W. Bode Lecture Prize. He has served as President of the European Control Association, IEEE CSS Vice President, on editorial boards of key journals and the Swedish Scientific Council for Natural Sciences and Engineering Sciences, and is Fellow of IEEE and the Royal Swedish Academy of Engineering Sciences.

Karl H. Johansson 现任瑞典皇家理工学院（KTH）电子工程与计算机科学领域瑞典研究委员会杰出教授，同时担任数字未来研究院创始人。他于隆德大学先后获得电气工程硕士学位与自动控制专业博士学位，曾在加州大学伯克利分校、加州理工学院等机构担任访问学者。其研究方向聚焦网络化控制系统与信息物理系统，研究成果应用于交通、能源及自动化网络领域。因其学术贡献，他荣获 IEEE、国际自动控制联合会（IFAC）等机构颁发的多项最佳论文奖及荣誉，包括：瑞典研究委员会杰出教授、Wallenberg学者、未来学术领军人物、IFAC 青年作者奖、IEEE CSS Hendrik W. Bode Lecture 奖。他历任欧洲控制协会（EUCA）主席、IEEE 控制系统学会（CSS）副主席，受聘于多家顶级权威期刊编委会，并任职于瑞典自然科学与工程科学理事会。现为 IEEE Fellow、瑞典皇家工程科学院院士。

内容简介 / Abstract

Cyber-physical-social systems are increasingly shaped by the interplay between network structure, human behavior, and algorithmic decision-making. In this context, social opinion systems provide a framework for understanding how individual beliefs evolve through interactions and how collective outcomes emerge. This talk addresses recent advances in the modeling, estimation, and control of such systems, with a focus on stochastic network interactions, influence mechanisms, and distributed inference. We will present mathematical models of opinion dynamics mainly focusing on the classical Friedkin–Johnsen model. By leveraging tools from concentration inequalities and random graph theory, we establish high-probability guarantees that relate microscopic interaction rules to macroscopic opinion patterns such as consensus, polarization, and clustering. We will further explore how estimation and control can be exerted in opinion networks. In particular, we introduce distributed estimation mechanisms that allow agents to infer latent quantities such as social power using only local interactions. Finally, we discuss optimization frameworks for strategic intervention, where external agents modify network connectivity to maximize long-term influence, represented by social power. The results stem from ongoing work with collaborators at KTH and elsewhere.

主持人 / Host

Alessandro Astolfi is a Fellow of the IEEE, IFAC, and IET, and a Member of Academia Europaea. He received his PhD degree in Electronic Engineering from the University of Rome in 1991. In 1992, he joined ETH Zurich, where he obtained an M.Sc. in Information Theory and a Ph.D. with Medal of Honor in 1995. He was also awarded a Ph.D. from the University of Rome in 1996. Since 1996, he has been with the Department of Electrical and Electronic Engineering at Imperial College London, where he is full Professor of Imperial College and KAUST and distinguished scientist of Jiangsu Provincial Applied Mathematics center. From 2010 to 2022, he served as Head of the Control and Power Group at Imperial College. He has received several major awards, including the IEEE CSS A. Ruberti Young Researcher Prize, the IEEE CSS George S. Axelby Outstanding Paper Award, the Automatica Best Paper Award, and the IEEE TCST Outstanding Paper Award. Prof. Astolfi has served in many leading editorial and professional roles, including Editor-in-Chief of European Journal of Control and IEEE Transactions on Automatic Control. He also served as Chair of the IEEE CSS Conference Editorial Board from 2010 to 2017 and is currently Vice Chair of the IFAC Technical Board.



Alessandro Astolfi 为 IEEE Fellow、IFAC Fellow、IET Fellow，欧洲科学院院士、意大利技术与工程院院士。1991 年，他于罗马大学获电子工程博士学位。1992 年进入苏黎世联邦理工学院深造，1995 年取得信息理论硕士学位，并获荣誉奖章博士学位；1996 年再度获罗马大学博士学位。1996 年起任职于伦敦帝国理工学院电气与电子工程系，现任帝国理工学院 & KAUST 全职教授，同时担任江苏省应用数学中心特聘科学家。2010-2022 年，担任帝国理工学院 Control and Power 团队负责人。他斩获多项国际重要学术奖项，包括：IEEE CSS A. Ruberti Young Researcher Prize、IEEE CSS George S. Axelby Outstanding Paper Award、the Automatica Best Paper Award 以及 IEEE TCST Outstanding Paper Award。Alessandro Astolfi 教授长期担任多项顶级期刊与学术组织重要职务，European Journal of Control 与 2018-2025 IEEE TAC 主编；2010 至 2017 年担任 IEEE 控制系统学会会议编委会主席，现任国际自动控制联合会技术委员会副主席。



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Scientific Research Center of Applied Mathematics



Optimal Filtering for Linear and Nonlinear Systems

2026, May 15, Friday 10:40 AM–11:20 AM

东南大学九龙湖校区综合大楼咏曼报告厅

主讲人 / Speaker



Alessandro Astolfi is a Fellow of the IEEE, IFAC, and IET, and a Member of Academia Europaea. He received his PhD degree in Electronic Engineering from the University of Rome in 1991. In 1992, he joined ETH Zurich, where he obtained an M.Sc. in Information Theory and a Ph.D. with Medal of Honor in 1995. He was also awarded a Ph.D. from the University of Rome in 1996. Since 1996, he has been with the Department of Electrical and Electronic Engineering at Imperial College London, where he is full Professor of Imperial College and KAUST and distinguish scientist of Jiangsu Provincial Applied Mathematics center. From 2010 to 2022, he served as Head of the Control and Power Group at Imperial College. He has received several major awards, including the IEEE CSS A. Ruberti Young Researcher Prize, the IEEE CSS George S. Axelby Outstanding Paper Award, the Automatica Best Paper Award, and the IEEE TCST Outstanding Paper Award. Prof. Astolfi has served in many leading editorial and professional roles, including Editor-in-Chief of European Journal of Control and IEEE Transactions on Automatic Control. He also served as Chair of the IEEE CSS Conference Editorial Board from 2010 to 2017 and is currently Vice Chair of the IFAC Technical Board.

Alessandro Astolfi 为IEEE Fellow、IFAC Fellow、IET Fellow，欧洲科学院院士、意大利技术与工程院院士。1991 年，他于罗马大学获电子工程博士学位。1992 年进入苏黎世联邦理工学院深造，1995 年取得信息理论硕士学位，并获荣誉奖章博士学位；1996 年再度获罗马大学博士学位。1996 年起任职于伦敦帝国理工学院电气与电子工程系，现任帝国理工学院 & KAUST全职教授，同时担任江苏省应用数学中心特聘科学家。2010-2022 年，担任帝国理工学院 Control and Power 团队负责人。他斩获多项国际重要学术奖项，包括：IEEE CSS A. Ruberti Young Researcher Prize、IEEE CSS George S. Axelby Outstanding Paper Award、the Automatica Best Paper Award以及IEEE TCST Outstanding Paper Award。Alessandro Astolfi 教授长期担任多项顶级期刊与学术组织重要职务，European Journal of Control 与 2018-2025 IEEE TAC主编；2010 至 2017 年担任 IEEE 控制系统学会会议编委会主席，现任国际自动控制联合会技术委员会副主席。

内容简介 / Abstract

The steady-state optimal filtering problem for linear systems is revisited with the objective of establishing further insights on the structure of the underlying solution. It is shown that, in addition to the invariance property of a suitably defined hyperplane, the optimal filter is related to a triangularizing change of coordinates for certain Hamiltonian dynamics associated to the filtering problem. The implication of the above observation is twofold. First, the novel interpretation admits a conceptually straightforward counterpart in the nonlinear setting in terms of invariant distributions. The latter then permit the design of steady state optimal filters for nonlinear systems that only rely upon the solutions of linear partial differential equations, the solution of which is independent from the specific time history of the measured output. The conditions may be further leveraged to determine a polynomial algebraic equation, which characterizes the solution of the filtering problem and which is expressed in the entries of the optimal filter gain alone, hence circumventing the need for solving the underlying Riccati equation.

主持人 / Host

Xinghuo Yu is a Distinguished Professor and an Associate Deputy Vice-Chancellorat Royal Melbourne Institute of Technology (RMIT University), Melbourne,Australia. He is a Fellow of the Australian Academy of Science, an Honorary Fellow of The Institution of Engineers Australia, and a Fellow of the IEEE, Australian Computer Society, and Australian Institute of Company Directors. Hewas the President of IEEE Industrial Electronics Society in 2018 and 2019. Hismain research areas include control systems, intelligent and complex systems, artificial intelligence and machine learning, and power and energy systems.

余星火现任澳大利亚墨尔本皇家理工大学（RMIT University）杰出教授、副校长助理。他是澳大利亚科学院院士、澳大利亚工程师学会荣誉会士，以及 IEEE、澳大利亚计算机学会和澳大利亚公司董事协会会士。2018年至2019 年，他曾担任 IEEE 工业电子学会主席。其主要研究方向包括控制系统、智能与复杂系统、人工智能与机器学习，以及电力与能源系统。



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Can Simple Controllers Achieve Robust Prescribed Performance for Uncertain Nonlinear Systems?

2026, May 15, Friday 11:20 AM–12:00 PM

东南大学九龙湖校区综合大楼咏曼报告厅

主讲人 / Speaker



George A. Rovithakis is currently a Professor and Director of the Automation and Robotics Laboratory in the Department of Electrical and Computer Engineering at Aristotle University of Thessaloniki. His research interests include nonlinear control, robust adaptive control, prescribed performance control, robot control, and control-identification of uncertain systems using neural networks. He has authored or co-authored three books and over 190 papers published in scientific journals, conference proceedings, and book chapters. He is ranked among the top 2% of researchers worldwide by Stanford University, based on the impact of his published work. His research on trajectory-oriented prescribed performance guarantees—such as maximum overshoot, minimum convergence rate, and maximum steady-state error—in nonlinear closed-loop systems with uncertain dynamics led to the development of the Prescribed Performance Control (PPC) methodology. He currently serves as an Associate Editor for the IEEE Transactions on Automatic Control and has previously served as an Associate Editor for the IEEE Trans.

on Neural Networks and the IEEE Trans on Control Systems Technology. Additionally, he has been a member of the IEEE Control Systems Society Conference Editorial Board and the European Control Association (EUCA) Conference Editorial Board. Dr. Rovithakis is a member of the Technical Chamber of Greece, an elected member of EUCA, and a former Chair of the IEEE Greece Section Control Systems Chapter.

George A. Rovithakis 现任亚里士多德大学电气与计算机工程系教授，并担任自动化与机器人实验室主任。他的研究兴趣包括非线性控制、鲁棒自适应控制、预设性能控制、机器人控制，以及利用神经网络对不确定系统进行控制与辨识。他已撰写或合著 3 部著作，并在科学期刊、会议论文集和书籍章节中发表论文 190 余篇。根据其已发表成果的影响力，他被斯坦福大学列入全球前 2% 研究人员名单。他关于非线性闭环系统在不确定动态下的轨迹导向型预设性能保证的研究——例如最大超调量、最小收敛速率和最大稳态误差——推动了预设性能控制（Prescribed Performance Control, PPC）方法的发展。他担任IEEE Transactions on Automatica Control编委，曾任IEEE Transactions on Neural Networks和IEEE Transactions on Control Systems Technology 副编辑。此外，他还曾担任 IEEE 控制系统学会会议编辑委员会和欧洲控制协会（EUCA）会议编辑委员会成员。Rovithakis 博士是希腊技术商会会员、EUCA 当选会员，并曾担任 IEEE 希腊分会控制系统分会主席。

内容简介 / Abstract

Traditionally, in control systems design, the stability of the closed-loop system, robustness against modeling imperfections and external disturbances, and performance metrics such as maximum overshoot, convergence rate, and steady-state accuracy are studied separately. Achieving desired performance is often done through a trial-and-error process in selecting control elements. Additionally, controller simplicity is a crucial requirement in real-world applications, as it typically enables easier monitoring, troubleshooting, and predictable system behavior. Autonomous systems, however, exhibit complex nonlinear and uncertain dynamics and operate across diverse environments. Can we design simple controllers that simultaneously ensure robust and prescribed performance? Join this lecture to explore these questions.

主持人 / Host

Changyun Wen received his B.Eng from Xi'an Jiaotong University, China in July 1983 and Ph.D from the University of Newcastle, Australia in Feb 1990. From August 1989 to August 1991, he was a Research Associate and then Postdoctoral Fellow at the University of Adelaide, Australia. He is presently a Full Professor at Nanyang Technological University, Singapore. He is a Fellow of IEEE, was a Member of the IEEE Fellow Committee from Jan 2011 to Dec 2013 and a Distinguished Lecturer of IEEE Control Systems Society from Feb 2010 to Feb 2013. He is also a Fellow of the Academy of Engineering, Singapore. He is the Editor-in-Chief of IEEE Transactions on Industrial Cyber-Physical Systems, a co-Editor-in-Chief of IEEE Transactions on Industrial Electronics (from July 2020), an Associate Editor of Automatica (from Feb 2006) and the Executive Editor-in-Chief of Journal of Control and Decision. He also served as an Associate Editor of IEEE Transactions on Automatic Control from 2000 to 2002, IEEE Transactions on Industrial Electronics (from May 2013 to Jan 2020) and IEEE Control Systems Magazine from 2009 to 2019, respectively. He has been actively involved in organizing international conferences playing the roles of General Chair, General Co-Chair, Technical Program Committee Chair, Program Committee Member, General Advisor, Publicity Chair and so on. He was the recipient of a number of awards, including the IES Prestigious Engineering Achievement Award from the Institution of Engineers, Singapore in 2005, and Best Paper Award of IEEE Transactions on Industrial Electronics in 2017.



温长云于1983年7月在中国西安交通大学获得工学学士学位，并于1990年2月在澳大利亚纽卡斯尔大学获得博士学位。1989年8月至1991年8月，他先后在澳大利亚阿德莱德大学担任研究助理和博士后研究员。现任新加坡南洋理工大学正教授。他是 IEEE Fellow，曾于2011年1月至2013年12月担任 IEEE Fellow 委员会成员，并于2010年2月至2013年2月担任 IEEE 控制系统学会杰出讲师。他同时也是新加坡工程院院士。现任 IEEE Transactions on Industrial Cyber-Physical Systems 主编、IEEE Transactions on Industrial Electronics 联合主编（自2020年7月起）、Automatica 副编辑（自2006年2月起），以及 Journal of Control and Decision 执行主编。他还曾分别担任 IEEE Transactions on Automatic Control 副编辑（2000年至2002年）、IEEE Transactions on Industrial Electronics 副编辑（2013年5月至2020年1月），以及 IEEE Control Systems Magazine 副编辑（2009年至2019年）。他长期积极参与国际会议的组织工作，曾担任大会主席、共同大会主席、技术程序委员会主席、程序委员会委员、大会顾问、宣传主席等职务。



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