杨国松

Center for Control, Dynamical Systems, and Computation
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科研方向

申请人的科研方向主要集中在信息物理系统的网络化控制，包括：

- 以切换和混杂系统为模型，实现信息物理系统中计算、网络与物理环境的无缝集成
- 以拓扑熵为工具，判断切换系统网络化控制的信息需求，并设计通信与控制一体化算法
- 利用小增益原理，为可容错混杂系统网络建立稳定性条件
- 将博弈论与自适应控制及机器学习相结合，解决网络安全中攻防两方间信息不对称的问题

工作履历

加利福尼亚大学圣巴巴拉分校，美国 2017/08 至现在
博士后，控制、动态系统与运算中心
导师：João P. Hespanha

教育背景

伊利诺伊大学厄巴纳-尚佩恩分校，美国 2013/10 至 2017/08
博士（电子与计算机工程）
毕业论文："Switched and hybrid systems with inputs: Small-gain theorems, control with limited information, and topological entropy"
导师：Daniel Liberzon

伊利诺伊大学厄巴纳-尚佩恩分校，美国 2011/08 至 2013/08
硕士（电子与计算机工程）
毕业论文："A Lyapunov-based small-gain theorem for interconnected switched systems"
导师：Daniel Liberzon

香港科技大学，中国香港 2007/09 至 2011/06
学士（电子工程，辅修数学）
导师：李泽湘

奖项与荣誉

2019 最佳论文奖：*ACM SIGBED HSCC Best Paper Award*，第 22 届 ACM International Conference on Hybrid Systems: Computation and Control，加拿大

2016 最佳海报奖：*Best Poster Award*，第 11 届 Coordinated Science Laboratory Student Conference，伊利诺伊大学厄巴纳-尚佩恩分校，美国

2016 *Graduate College Conference Travel Award*，伊利诺伊大学厄巴纳-尚佩恩分校，美国

2007 至 2011 *University Scholarship*，香港科技大学，中国香港

2007 至 2011　*School of Engineering Scholarship*，香港科技大学，中国香港

2007 至 2011　*The Joseph Lau Luen Hung Charitable Trust Scholarship*，香港科技大学，中国香港

2007 至 2011　*ECE Outstanding Freshmen Scholarship*，香港科技大学，中国香港

2007 至 2009　*Dean's List*，香港科技大学，中国香港

2007　金牌，第 8 届亚洲物理奥林匹克竞赛，上海

学术成果

工作论文

[W3] Henrique Ferraz, Guosong Yang, and João P. Hespanha, "Distributed leader-follower model predictive control," in preparation

[W2] Guosong Yang, Daniel Liberzon, and João P. Hespanha, "Topological entropy of nonlinear switched and time-varying systems," in preparation

[W1] Guosong Yang, Radha Poovendran, and João P. Hespanha, "Adaptive learning in two-player Stackelberg games with application to network security," submitted for journal publication

期刊论文

[J6] João P. Hespanha, Raphael Chinchilla, Ramon R. Costa, Murat K. Erdal, and Guosong Yang, "Forecasting COVID-19 cases based on a parameter-varying stochastic SIR model," *Annual Reviews in Control*, vol. 51, pp. 460–476, Apr. 2021

[J5] Guosong Yang, A. James Schmidt, Daniel Liberzon, and João P. Hespanha, "Topological entropy of switched linear systems: General matrices and matrices with commutation relations," *Mathematics of Control, Signals, and Systems*, vol. 32, no. 3, pp. 411–453, Sep. 2020

[J4] Guosong Yang and Daniel Liberzon, "Feedback stabilization of switched linear systems with unknown disturbances under data-rate constraints," *IEEE Transactions on Automatic Control*, vol. 63, no. 7, pp. 2107–2122, Jul. 2018

[J3] Kunihisa Okano, Masashi Wakaiki, Guosong Yang, and João P. Hespanha, "Stabilization of networked control systems under clock offsets and quantization," *IEEE Transactions on Automatic Control*, vol. 63, no. 6, pp. 1708–1723, Jun. 2018

[J2] Andrii Mironchenko, Guosong Yang, and Daniel Liberzon, "Lyapunov small-gain theorems for networks of not necessarily ISS hybrid systems," *Automatica*, vol. 88, pp. 10–20, Feb. 2018

[J1] Guosong Yang and Daniel Liberzon, "A Lyapunov-based small-gain theorem for interconnected switched systems," *Systems & Control Letters*, vol. 78, pp. 47–54, Apr. 2015

书籍章节

[Ch1] Guosong Yang and João P. Hespanha, "Modeling and mitigating link-flooding distributed denial-of-service attacks via learning in Stackelberg games," in *Handbook of Reinforcement Learning and Control*, Kyriakos G. Vamvoudakis, Yan Wan, Frank L. Lewis, and Derya Cansever, Eds. Cham, Switzerland: Springer, 2021, pp. 433–463

会议论文

[C13] Raphael Chinchilla, Guosong Yang, Murat K. Erdal, Ramon R. Costa, and João P. Hespanha, "A tale of two doses: Model identification and optimal vaccination for COVID-19," in *60th IEEE Conference on Decision and Control*, Austin, TX, USA, 2021, to be published

[C12] Guosong Yang, Daniel Liberzon, and João P. Hespanha, "Topological entropy of switched nonlinear systems," in *24th ACM International Conference on Hybrid Systems: Computation and Control*, Nashville, TN, USA, 2021, 11 pages

[C11] Guosong Yang, Radha Poovendran, and João P. Hespanha, "Adaptive learning in two-player Stackelberg games with continuous action sets," in *58th IEEE Conference on Decision and Control*, Nice, France, 2019, pp. 6905–6911

[C10] Guosong Yang, João P. Hespanha, and Daniel Liberzon, "On topological entropy and stability of switched linear systems," in *22nd ACM International Conference on Hybrid Systems: Computation and Control*, Montreal, Canada, 2019, pp. 119–127 (会议录用率 24%，**最佳论文奖**)

[C9] Guosong Yang and João P. Hespanha, "On topological entropy of switched linear systems with pairwise commuting matrices," in *56th Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, USA, 2018, pp. 429–436（特邀论文）

[C8] Guosong Yang, A. James Schmidt, and Daniel Liberzon, "On topological entropy of switched linear systems with diagonal, triangular, and general matrices," in *57th IEEE Conference on Decision and Control*, Miami Beach, FL, USA, 2018, pp. 5682–5687

[C7] Guosong Yang, Hossein Hosseini, Dinuka Sahabandu, Andrew Clark, João P. Hespanha, and Radha Poovendran, "Modeling and mitigating the Coremelt attack," in *2018 American Control Conference*, Milwaukee, WI, USA, 2018, pp. 3410–3416

[C6] Guosong Yang, Daniel Liberzon, and Zhong-Ping Jiang, "Stabilization of interconnected switched control-affine systems via a Lyapunov-based small-gain approach," in *2017 American Control Conference*, Seattle, WA, USA, 2017, pp. 5182–5187

[C5] Guosong Yang, Daniel Liberzon, and Andrii Mironchenko, "Analysis of different Lyapunov function constructions for interconnected hybrid systems," in *55th IEEE Conference on Decision and Control*, Las Vegas, NV, USA, 2016, pp. 465–470（特邀论文）

[C4] Guosong Yang and Daniel Liberzon, "Finite data-rate stabilization of a switched linear system with unknown disturbance," in *10th IFAC Symposium on Nonlinear Control Systems*, vol. 49, no. 18, Monterey, CA, USA, 2016, pp. 1085–1090

[C3] Guosong Yang and Daniel Liberzon, "Stabilizing a switched linear system with disturbance by sampled-data quantized feedback," in *2015 American Control Conference*, Chicago, IL, USA, 2015, pp. 2193–2198

[C2] Guosong Yang and Daniel Liberzon, "Input-to-state stability for switched systems with unstable subsystems: A hybrid Lyapunov construction," in *53rd IEEE Conference on Decision and Control*, Los Angeles, CA, USA, 2014, pp. 6240–6245

[C1] Andrii Mironchenko, Guosong Yang, and Daniel Liberzon, "Lyapunov small-gain theorems for not necessarily ISS hybrid systems," in *21st International Symposium on Mathematical Theory of Networks and Systems*, Groningen, Netherlands, 2014, pp. 1001–1008

科研项目申请经历

1. 项目申请撰稿人：National Science Foundation grant CMMI-1662708: "Switched Control Systems with Limited Information: An Entropy Approach to Stabilization and Disturbance Attenuation" (Program: Dynamics, Control and Systems Diagnostics), PI: Daniel Liberzon, Jul. 2017–Jun. 2021, Award: $349,540（依托单位：伊利诺伊大学厄巴纳-尚佩恩分校）

科研项目参与经历

1. National Science Foundation grant ECCS-2029985: "RAPID: Informed Decision Making for Pandemic Management" (Program: COVID-19 Research), PI: João P. Hespanha, May 2020–Apr. 2022, Award: $146,274（依托单位：加利福尼亚大学圣巴巴拉分校）
2. National Science Foundation grant EPCN-1608880: "Online Optimization for the Control of Small Autonomous Vehicles" (Program: Energy, Power, Control, and Networks), PI: João P. Hespanha, Sep. 2016–Aug. 2021, Award: $359,838（依托单位：加利福尼亚大学圣巴巴拉分校）
3. Office of Naval Research grant N00014-16-1-2710: "ADAPT: Analytical Framework for Actionable Defense against Advanced Persistent Threats" (Program: Multidisciplinary University Research Initiative), Leading PI: Radha Poovendran, PI: João P. Hespanha, 2016–2021（依托单位：加利福尼亚大学圣巴巴拉分校）
4. National Science Foundation grant CNS-1329650: "ROSELINE: Enabling Robust, Secure, and Efficient Knowledge of Time Across the System Stack" (Program: Cyber-Physical Systems), PI: João P. Hespanha, Jun. 2014–May 2020, Award: $544,726（依托单位：加利福尼亚大学圣巴巴拉分校）
5. National Science Foundation grant ECCS-1231196: "Hybrid Small-Gain Theorems for Nonlinear Networked and Quantized Control Systems" (Program: Energy, Power, Control, and Networks), PI: Daniel Liberzon, Sep. 2012–Aug. 2016, Award: $240,000（依托单位：伊利诺伊大学厄巴纳-尚佩恩分校）
6. National Science Foundation grant CNS-1217811: "Limited-Information Control of Hybrid Systems via Reachable Set Propagation" (Program: Computer Systems Research), PI: Daniel Liberzon, Sep. 2012–Aug. 2016, Award: $280,000（依托单位：伊利诺伊大学厄巴纳-尚佩恩分校）

会议与学术报告

特邀报告

1. *56th Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, USA, Oct. 2018
2. *55th IEEE Conference on Decision and Control*, Las Vegas, NV, USA, Dec. 2016

会议报告

1. *24th ACM International Conference on Hybrid Systems: Computation and Control*, Nashville, TN, USA, May 2021
2. *37th Southern California Control Workshop*, University of California, San Diego, San Diego, CA, USA, Jan. 2020
3. *22nd ACM International Conference on Hybrid Systems: Computation and Control*, Montreal, Canada, Apr. 2019（会议录用率 24%，最佳论文奖）
4. *57th IEEE Conference on Decision and Control*, Miami Beach, FL, USA, Dec. 2018
5. *35th Southern California Control Workshop*, University of California, Los Angeles, Los Angeles, CA, USA, Nov. 2018
6. *2018 American Control Conference*, Milwaukee, WI, USA, Jun. 2018

7. *2017 American Control Conference*, Seattle, WA, USA, May 2017
8. *10th IFAC Symposium on Nonlinear Control Systems*, Monterey, CA, USA, Aug. 2016
9. *11th Coordinated Science Laboratory Student Conference*, University of Illinois at Urbana-Champaign, Urbana, IL, USA, Feb. 2016（最佳海报奖）
10. *2015 American Control Conference*, Chicago, IL, USA, Jul. 2015
11. *53rd IEEE Conference on Decision and Control*, Los Angeles, CA, USA, Dec. 2014
12. *2nd Midwest Workshop on Control and Game Theory*, University of Notre Dame, Notre Dame, IN, USA, Apr. 2013

学术报告

1. *e-TEC Talks @SNU Summer 2021*, Seoul National University, Seoul, Korea, Aug. 2021
2. *Multi-Agent Robotics Lab*, University of California, San Diego, San Diego, CA, USA, Mar. 2017 (Host: Jorge Cortés and Sonia Martínez)
3. *Arcak Lab*, University of California, Berkeley, Berkeley, CA, USA, Mar. 2017 (Host: Murat Arcak)
4. *Hybrid Systems Laboratory*, University of California, Santa Cruz, Santa Cruz, CA, USA, Feb. 2017 (Host: Ricardo G. Sanfelice)
5. *Center for Control, Dynamical Systems, and Computation*, University of California, Santa Barbara, Santa Barbara, CA, USA, Nov. 2016 (Host: Andrew R. Teel)
6. *Cyber-Physical Systems Laboratory*, University of California, Los Angeles, Los Angeles, CA, USA, Oct. 2016 (Host: Paulo Tabuada)

教学与学生指导

加利福尼亚大学圣巴巴拉分校，美国

- 本科生科研项目导师："Remote Tracking of Unmanned Ground Vehicles"
- 高中生科研项目导师："Motion Planning for Unmanned Ground Vehicles"

伊利诺伊大学厄巴纳-尚佩恩分校，美国

- 研究生课程助教："ECE517 Nonlinear and Adaptive Control''（非线性与自适应控制）
- 研究生课程助教："ECE528 Analysis of Nonlinear Systems''（非线性系统分析）

审稿与组织经历

期刊审稿人

- *IEEE Transactions on Automatic Control* (8)
- *Automatica* (6)
- *System & Control Letters* (2)
- *Nonlinear Analysis: Hybrid Systems* (2)
- *IEEE Transactions on Control of Network Systems* (1)

- *IEEE Control Systems Letters* (1)
- *Communications in Nonlinear Science and Numerical Simulation* (1)
- *Mathematics of Control, Signals, and Systems* (1)

会议审稿人

- *American Control Conference* (2017, 2018, and 2021)
- *IEEE Conference on Decision and Control* (2019 and 2020)
- *IFAC World Congress* (2020)
- *IFAC Workshop on Distributed Estimation and Control in Networked Systems* (2019)
- *ACM International Conference on Hybrid Systems: Computation and Control* (2016 and 2017)
- *IFAC Conference on Modelling, Identification and Control of Nonlinear Systems* (2015)

会议组织者

- 会议项目委员会成员：“Repeatability Evaluation” at the *25th ACM International Conference on Hybrid Systems: Computation and Control*, May 2022
- 会议项目委员会成员：“Repeatability Evaluation” and “Posters and Demos” at the *24th ACM International Conference on Hybrid Systems: Computation and Control*, May 2021
- 会议分会主席：“Switched Systems I” at the *57th IEEE Conference on Decision and Control*, Miami Beach, FL, USA, Dec. 2018