Yuan Wang

Department of Mathematical Sciences
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Education

Rutgers, the State University of New Jersey *August 1990*
PhD in Mathematics

Chinese Academy of Sciences *May 1984*
MS in Mathematics

Shandong University, China *Jan. 1982*
BS in Mathematics

Experience

- Department of Mathematical Sciences, Florida Atlantic University.
  - Professor: since 2000
    - Department Chair: since July 2023
    - Departmental Graduate Director: May 2015–May 2020.
  - Associate Professor: 1995–2000.
  - Assistant Professor: 1990–1995.
- Graduate Research/Teaching Assistant: Department of Mathematics, Rutgers University, September 1986–May 1990.
- Graduate Teaching Assistant: Department of Mathematics, Purdue University, September 1985–May 1986.
- Research Member: Institute of Systems Science, Chinese Academy of Sciences, Beijing, August 1984–August 1985.

Academic Visits

- The Institute of Systems Science, Chinese Academy of Sciences, Beijing, China. Summers of 2001, 2002, 2004, 2005.
- The Research School of Information Sciences and Engineering, Australian National University, Canberra, Australia. March 1996–April 1996.
- LAGEP–CNRS, Université Claude Bernard Lyon I, Lyon, France. February 1994–May 1994.
- The Institute of Mathematics and Its Applications, University of Minnesota, Minneapolis, Minnesota. February 1993–March 1993.

Honors and Awards

- *IEEE Fellow*, class of 2013.
- *NSF Young Investigator Award*, 1994.
- *Alfred P. Sloan Doctoral Dissertation Fellowship*, 1989–1990.

Funding and Grants

- PI: *NSF Grant DMS–9108250* "Input/Output Equations and Nonlinear Realizability", $30,600, August 1991 – July 1993.
- PI: *NSF Grant DMS–9403924* "Nonlinear Control Theory: Topics Related to Stabilizability, Observability and Realizability", $68,604, June 1994 – May 1996.
- PI: *NSF Young Investigator Award DMS–9457826*, $125,000, August 1994 – July 2000.
- PI: *NSF Grant DMS–0072620*, "Characterizations on Stability Properties for Nonlinear Systems", $80,939, July 2000 – June 2004.

- PI: *NSF Grant DMS–0504557*, "Collaborative Research: Nonlinear Control Analysis and Design Based on Input to State Stability", $90,000. August 2005 – July 2008.
- PI: *NSF Grant DMS-0906918*, "Collaborative Research: New Tools for Nonlinear Systems Analysis and Synthesis", $115,000, Oct 2009 – Sept. 2013.
- co-PI: *NSF Conference Proposal*, "International Conference: Perspectives and Future Directions in Systems and Control Theory", $35,000, May 2011 – April 2012.
- *Mini-grant through the NSF INCLUSION program*, "Dare to BEE", 2017, $4,800, as the PI and the faculty advisor with the FAU AWM Student Chapter.
- PI: *AWM (Association for Women in Mathematics) Travel Grant*, $3,500, July 2018.
- PI: *Elsevier Mathematical Sciences Sponsorship Fund*, Promoting Diversity in Graduate Study in Mathematics, $3,000, 2018–2019.
- *School of Mathematics, Institute of Advanced Study (IAS)*, as a PI and the faculty advisor with the FAU AWM Student Chapter for the annual event Florida Women in Math Day: $3,000 for 2018; $3,000 for 2019; $3,500 for 2020, $4,000 for 2021, and $4,000 for 2022.

Professional Services

Editorial Work

- Associate Editor, *the IEEE Conference Editorial Board*, January 1994 – December 1995.
- Associate Editor, *Systems & Control Letters*, 1995 – 2003.
- Associate Editor, *Journal of Control Theory and Applications*, 2003 – 2009.
- Associate Editor, *Journal of Systems Science and Complexity*, 2002 – 2005.
- Associate Editor, *European Series of Applied and Industrial Mathematics: Control, Optimization and the Calculus of Variations*, 2013 – 2023.
- Associate Editor, *the IEEE Conference Editorial Board*, 2015–2018.
- Moderator of the sections math.OC (Optimization and Control in Mathematics) and cs.SY (Systems and Control in Computer Science) for the e-Print archive `http://arxiv.org/archive/`, since 1999. The primary duty is to screen submissions based on contents and arXiv policy to determine if the submissions are appropriate for the categories. Average daily submissions to the categories are about 60–80, which takes about 30 to 40 minutes to complete screening.

Organization of Meetings and Program Committees

- Co-organizer of Trimester in Combinatorics and Control (COCO 2010), Madrid, Spain, April – June, 2010.
- Co-organizer of the International Conference: Perspectives and Future Directions in Systems and Control Theory, Rutgers University, New Brunswick, NJ, May, 2011.
- Publicity Co-chair: the annual Chinese Control and Decision Conference, since 2015.
- Local Arrangements Co-chair: the 57th IEEE Conference on Decision and Control, Miami Beach, Dec. 2018 (https://cdc2018.ieeecss.org/committees.php, about 2,000 attendees).
- Program Committee: the 25th International Symposium on Mathematical Theory of Networks and Systems (MTNS), 2022.
- Frequent organizer/co-organizer, chair/co-chair of conference sessions.

Reviewing Services

- Frequent Reviewer and Panelist of NSF proposals.

- Frequent referee for various international journals including: *Automatica; IEEE Transactions on Automatic Control; International Journal of Control; Mathematics of Control, Signals, and Systems; SIAM Journal on Control and Optimization; Systems & Control Letters; and IEEE Control Conferences.*

Mentor and Facilitator — Math Alliance (https://mathalliance.org/welcome/), 2016–2022: activities including mentoring one or two Alliance Scholars yearly, attending annually and hosting graduate recruitment events at the annual meetings of Math Alliance.

Recent FAU Service

- Faculty advisor — the Student Chapter of Associate for Women in Mathematics at FAU, 2017–2024 (created the chapter and serving as the founding advisor).
- Created the Student Chapter of America Mathematics Associations (AMS) at FAU, 2017.
- Created the Student Chapter of Society of Industrial and Applied Mathematics (SIAM) at FAU, 2016.
- Diversity, Equity, and Inclusion committee, College of Science, Fall 2021.
- Liaison between the department and the national Math Alliance, since Fall 2016.
- Departmental Graduate Director: 2015–2020.
- Outreach activities: Frequent volunteer at Science Olympiad by College of Science; FAU Math Day events; K-12 Math competitions; Mu Alpha Theta competitions.
- Co-organizer with the FAU AWM Chapter of the workshop "Florida Women in Math Day", 2019, 2020, 2021, and 2022.

Professional Memberships

- American Mathematical Society.
- Society for Industrial and Applied Mathematics.
- The Institute of Electrical and Electronics Engineers (IEEE).
- Association for Women in Mathematics.

Graduate Students Supervised

- R.H. Harsha Nawarathna, Ph.D. in Mathematics, graduated in Summer 2023.
- Hasala G. Kankannamalage, Ph.D. in Mathematics, graduated in Summer 2017.
- Yang Yang, Ph.D. in Mathematics, graduated in Spring 2015.
- Shanaz Tiwari, Ph.D. in Mathematics, graduated in Spring 2012.
- Christian Popescuse, M.Sc. in Mathematics, graduated in Spring 2002.
- Heather Hope-Gill, M.Sc. in Mathematics, graduated in Summer 2000.
- Kehan Gao, M.Sc. in Mathematics, graduated in Summer 1999.

Courses Taught

- **Undergraduate:** College Algebra, Math for Liberal Arts 1–2, Calculus 1–3, Matrix Theory, Linear Algebra 2, Discrete Math, Differential Equations, Engineering Mathematics 1–2, Modern Algebra, Introductory Complex Analysis, Modern Analysis.
- **Graduate:** Introductory Analysis 1–2, Multi-variable Analysis, Real Analysis, Complex Analysis, General Topology, Linear Algebra, Mathematical Control Theory, Nonlinear Control Systems.

Publications

71. "On Integral Input-to-State Stability for Nonlinear Systems with Small Time-Delays", *Control Systems and Technology*, DOI https://doi.org/10.1007/s11768-023-00184-5, 13 pp. 2024 (with R.H. H. Nawarathna, and Y. Lin.)

70. "Robust output stability properties for nonlinear delay systems", *Dynamics of Continuous, Discrete and Impulsive Systems Series B: Applications and Algorithms*, Vol. 30, pp.225-270, 2023 (with H. G. Kankannamalage and Y. Lin).

69. "The ISS framework for time-delay systems: a survey", *Mathematics of Control, Signals, and Systems*, Vol. 35, pp.237–306, 2023 (with A. Chaillet, I. Karafyllis, and P. Pepe).

68. "Growth conditions for global exponential stability and exp-ISS of time-delay systems under point-wise dissipation", *Systems and Control Letters*, Vo. 178, 105570, 11 pp., 2023 (with A. Chaillet, I. Karafyllis, and P. Pepe).

67. "Is Global Asymptotic Stability Necessarily Uniform for Time-Invariant Time-Delay Systems?", *SIAM Journal on Control and Optimization*, Vol. 60, pp.3237-3261, 2022 (with A. Chaillet, I. Karafyllis, and P. Pepe).

66. "Uniform Global Asymptotic Stability for Time-Invariant Delay Systems", *Proc. of the 61th IEEE Conference on Decision and Control*, pp. 6875-6880, 2022 (with A. Chaillet, I. Karafyllis, and P. Pepe).

65. "Remarks on Lyapunov-Krasovskii functions for integral input-to-output stability properties", *Proc. of the IFAC Conference on Modelling, Identification and Control of Nonlinear Systems*, pp.135–340, 2021 (with R.H. Harsha Nawarathna and Y. Lin).

64. "On integral input-to-output stability properties", *Proc. of the 59th IEEE Conference on Decision and Control*, pp.6285–6290, 2020 (with R.H. Harsha Nawarathna and Y. Lin).

63. "Remarks on Lyapunov-Krasovskii functionals with weak decay rates", *Proc. of the 15th IEEE International Conference on Control & Automation*, pp.21–26, 2019 (with H. G. Kankannamalage and Y. Lin).

62. "Lyapunov descriptions of integral-input-to-state-stability for systems with delays", *Proc. of the 57th IEEE Conference on Decision and Control*, pp.3944–3949, 2018 (with Y. Lin).

61. "Remarks on regularity properties of Lyapunov-Krasovskii functionals", *Proc. of the 14th IEEE International Conference on Control & Automation*, pp. 52–57, 2018 (with Y. Lin).

60. "On Lyapunov-Krasovskii characterizations of input-to-output stability", *Proc. of the 20th World Congress of the International Federation of Automation Control*, pp. 14362–14367, 2017 (with H. G. Kankannamalage and Y. Lin).

59. "On Notions of input-to-output stability for nonlinear systems with time delays", *Proc. of 13th IEEE International Conference on Control & Automation*, pp. 490–495, 2017 (with H .G. Kankannamalage and Y. Lin).

58. "Lyapunov descriptions of robust output stability for systems with delays", in *Proceedings of the 55th Conference on Decision and Control*, pp.6416-6421, 2016 (with H.G. Kankannamalage).

57. "Stability Analysis via Averaging for Singularly Perturbed Nonlinear Systems with Delays", in *Proc. of the 12th IEEE International Conference on Control & Automation*, pp.92-97, 2016 (with Y. Yang and Y. Lin).

56. "Stability analysis for switched systems with ISS and unstable time-delayed subsystems", in *Proc. of 2016 Chinese Control and Decision Conference*, pp.905-909, 2016 (with Z.P. Jiang and Y. Lin).

55. "Input-to-state stability of switched systems with time delays", in *Recent Results on Nonlinear Delay Control Systems*, edited by M.Malisoff etc. pp. 225–241, 2015. (with Y. Lin and Z.P. Jiang).

54. "Stability analysis via averaging for nonlinear systems with delays", *Proc. of the 53rd Conference on Decision and Control*, pp.2334-2339, 2014 (with Y. Yang).

53. "A robust converse Lyapunov theorem for systems with disturbances taking values in a Banach space", Journal of Systems Science and Mathematical Sciences, Vol. 34, pp.1345–1359, 2014 (with H.G. Kankannamalage).

52. "Robust Stability of singularly perturbed systems with delays", *Proc. of the 52nd Conference on Decision and Control*, pp. 3975–3980, 2013 (with Y. Yang).

51. "Stability of nonlinear switched systems with delays", *Proc. the 32nd Chinese Control Conference*, pp. 1544-1548, 2013 (with Z.P. Jiang and Y. Lin).

50. "Nonlinear small-gain theorems for large-scale time delay systems", Dynamics of Continuous, Discrete and Impulsive Systems, Series A: Mathematical Analysis, Vol.19, pp.27-63, 2012 (with S. Tiwari and Z.P. Jiang).

49. "Remarks on integral-ISS for systems with delays", *Proc. of the 10th World Congress on Intelligent Control and Automation*, pp.2227–2232, 2012 (with S. Tiwari and Z.P. Jiang).

48. "Smooth universal inputs for smooth systems: a formal power series approach", *Proc. of the 20th International Symposium on Mathematical Theory of Networks and Systems*, CD-Rom 8 pages, 2012 (with W.S. Gray).

47. "On stability analysis of nonlinear singularly perturbed systems with delays", *Journal of Systems Science and Mathematical Sciences*, Vol. 32, pp. 1239–1256, 2012 (with H. Qin).

46. "New results on input-to-state stability for nonlinear time-delay systems with applications", *Proc. of the 8th World Congress on Intelligent Control and Automation*, pp. 719-724, 2011 (with S. Tiwari, Y.Lin, and Z.P. Jiang).

45. "On stability of time-varying systems with time delays", Proc. of the 50th IEEE Conference on Decision and Control and European Control Conference, pp.314–319, 2011 (with S. Tiwari).

44. "Razumikhin-type small-gain theorems for large-scale systems with delays", *Proc. of the 49th IEEE Conference on Decision and Control*, pp. 7407-7412, 2010 (with S. Tiwari).

43. "Stabilization of time-varying nonlinear systems: a control Lyapunov function approach", *Journal of Systems Science and Complexity*, Vol.22, pp.683–696, 2009 (with Z.P.Jiang and Y.Lin).

42. "Input classes for identification of bilinear systems", *IEEE Transactions on Automatic Control*, Vol. 54, pp.195–207, 2009 (with E.D. Sontag and A. Megretski).

41. "Non-causal Fliess operators and their shuffle algebra", *International Journal of Control*, Vol. 81, pp. 342–355, 2008 (with S. Gray).

40. "Uniformly universal inputs", *Analysis and Design of Nonlinear Control Systems*, pp. 9–24. Springer, London, 2007 (with E.D. Sontag).

39. "Accessibility of switched linear systems", *IEEE Trans. Automatic Control*, Vol. 51, pp. 1486–1491, 2006 (with D. Cheng and Y. Lin).

38. "A cooperative system which does not satisfy the limit set dichotomy", *Journal of Differential Equations*, Vol. 224, pp. 373–384, 2006. (with E.D. Sontag).

37. "Uniform stability properties of switched systems with switchings governed by digraphs", *Nonlinear Analysis: special issue on Hybrid Systems and Applications* Vol. 63, pp. 472–490, 2005 (with J.L. Mancilla-Aguilar, R. Garcia, and E.D. Sontag).

36. "On the representation of switched systems with inputs by perturbed control systems," *Nonlinear Analysis: Theory, Methods & Applications*, Vol. 60, 1111-1150, 2005 (with J.L. Mancilla-Aguilar, R. Garcia, and E.D. Sontag).

35. "Stabilization of switched linear systems", *IEEE Trans. Automatic Control*, Vol. 50, pp. 661–665, 2005 (with D. Cheng, L. Guo, and Y. Lin).

34. "Input to state stability, nonlinear small-gain theorems and their applications to discrete-time feedback systems", *Automatica*, Vol. 40, pp. 2129–2136, 2004 (with Z.P. Jiang and Y. Lin).

33. " A note on overshoot estimation in pole placements", *Journal of Control Theory and Applications*, Vol. 2, pp. 161–164, 2004 (with D. Cheng, L. Guo, and Y. Lin).

32. "Uniform global asymptotic stability of differential inclusions", *Journal of Dynamical and Control Systems*, Vol. 10, pp. 391–412, 2004 (with D. Angeli, B. Ingalls, and E.D. Sontag).

31. "Separation principles for input-output and integral-input to state stability", *SIAM J. of Control and Optimization*, Vol. 43, pp. 256–276, 2004 (with D. Angeli, B. Ingalls, and E.D. Sontag)

30. "Input-to-state stability with respect to inputs and their derivatives", *International Journal of Robust and Nonlinear Control*, Vol. 13, pp. 1035–1056, 2003 (with D. Angeli and E.D. Sontag).

29. "An infinite-time relaxation theorem for differential inclusions", *Proceedings of the American Mathematical Society*, Vol. 131, pp. 487–499, 2003 (with B. Ingalls and E.D. Sontag).

28. "Small gain theorems on input-to-output stability", *Dynamics of Continuous Discrete and Impulsive Systems, Series B–Applications & Algorithms*, pp. 220–224, 2003 (with Z. Jiang).

27. "Universal construction of feedback laws achieving ISS and integral-ISS attenuation", *Systems & Control Letters*, Vol. 46, pp. 111–127, 2002(with D. Liberzon and E.D. Sontag).

26. A converse Lyapunov theorem for discrete-time systems with disturbances, *Systems & Control Letters*, Vol. 45, pp. 49–58, 2002 (with Z.P. Jiang).

25. "Fliess operators on L_p spaces: convergence and continuity". *Systems & Control Letters*, Vol. 46, pp. 67–74, 2002 (with S. Gray).

24. "Input-to-state stability properties for discrete-time nonlinear systems", *Automatica*, Vol. 37, pp. 857–869, 2001. (With Z. P. Jiang).

23. "Input-output-to-state stability." *SIAM J. of Control and Optimization*, Vol. 39, pp. 1874–1928, 2001 (with M. Krichman and E.D. Sontag).

22. "Lyapunov characterizations of input to output stability", *SIAM J. of Control and Optimization*, Vol. 39, pp. 226–249, 2001 (with E. D. Sontag).

21. "Further equivalences and semiglobal versions of integral input to state stability", *Dynamics and Control*, Vol. 10, pp. 127–149, 2000 (with D. Angeli and E. D. Sontag).

20. "A characterization of integral input to state stability," *IEEE Transactions on Automatic Control*, Vol. 45, pp. 1082–1097, 2000 (with D. Angeli and E.D. Sontag).

19. "Notions of input to output stability", *Systems & Control Letters*, **38**, (1999), pp. 351-359 (with E. D. Sontag).

18. "Output-to-state stability and detectability of nonlinear systems," *Systems & Control Letters*, Vol. 29, pp. 279–290, 1997 (with E. D. Sontag).

17. "New characterizations of the input to state stability property," *IEEE Transactions on Automatic Control*, Vol. 41, pp. 1283–1294, 1996 (with E. D. Sontag).

16. "Stabilization in spite of matched unmodelled dynamics and an equivalent definition of input-to-state stability," *Mathematics of Control, Signals, and Systems*, Vol. 9, pp. 1–33, 1996 (with L. Praly).

15. "Generalized input/output equations and nonlinear realizability," *International Journal of Control*, Vol. 64, no. 4, pp. 615–629, 1996.

14. "A smooth converse Lyapunov theorem for robust stability," *SIAM Journal on Control and Optimization*, Vol. 34, pp. 124–160, 1996 (with Y. Lin, and E. D. Sontag).

13. "A Lyapunov formulation of nonlinear small gain theorem for interconnected systems," *Automatica*, Vol. 32, no. 8, pp. 1211-1215, 1996 (with I. M. Y. Mareels and Z.-P. Jiang).

12. "Analytic constraints and realizability for analytic input/output operators," *Journal of Mathematical Control and Information*, Vol. 12, pp. 331–346, 1995.

11. "On characterizations of the input-to-state stability property," *Systems & Control Letters*, Vol. 24, pp. 351–359, 1995 (with E. D. Sontag).

10. "Input to state stabilizability for parameterized families of systems," *International Journal of Robust and Nonlinear Control*, Vol. 5, no. 3, pp. 187–205, 1995 (with Y. Lin and E. D. Sontag).

9. "Orders of input/output differential equations and state space dimensions," *SIAM J. Control and Optimization*, Vol. 33, no. 4, pp. 1102–1126, 1995 (with E. D. Sontag).

8. "Generating series and nonlinear systems: Analytic aspects, local realizability and i/o representations," *Forum Mathematicum*, Vol. 4, pp. 299–322, 1992 (with E. D. Sontag).

7. "Algebraic differential equations and rational control systems," *SIAM J. Control and Optimization*, Vol. 30, pp. 1126–1149, 1992 (with E. D. Sontag).

6. "Pole shifting for families of linear systems depending on at most three parameters," *Linear Algebra and Its Applications*, Vol. 138, pp. 3–38, 1990 (with E. D. Sontag).

5. "On two definitions of observation spaces," *Systems and Control Letters*, Vol. 13, pp. 279–289, 1989 (with E. D. Sontag).

4. "Resistance of generalized linear systems to disturbances," *Acta Math. Sci.*, Vol. 7, no. 3, pp. 353–360, 1987.

3. "The internal model principle for generalized linear systems," *J. Systems Science and Mathematical Sciences*, Vol. 6, no. 1, pp. 65–75, 1986.

2. "Full state output regulation for generalized systems," *Control Theory and Its Applications*, Vol. 3, no. 3, pp. 69–76, 1986.

1. "Choosing the weight matrices in *LQ* problems," *Information and Control*, Vol. 13, no. 4, pp. 7–11, 1984.

Recent Plenary Lectures and Panels.

- Program Committee of 25th International Symposium on Mathematical Theory of Network and Systems, Bayreuth, Germany, Sept 2022.
- Plenary Panel: Women in Control Theory, *the 40th Chinese Control Conference*, online, July 2021.
- Co-Chair, Committee of Local Arrangements: *the 57th IEEE Conference on Decision and Control*, Miami, Florida, December 2018 (about 2,000 attendees).
- Invited Lecture: "Notions of input-to-output stability for systems with time-delays", *Workshop on Stability and Control of Infinite-Dimensional Systems*, Passau, Germany, October, 2016.
- Plenary Panel: Visions of Control and Automation, *the 12th IEEE International Conference on Control & Automation*, Kathmandu, Nepal. June 2016.
- Distinguished Lecture: "On stability analysis for nonlinear systems with time delays", *the 27th Chinese Control and Decision Conference*, Qingdao, China, May 2015.
- Organizing Committee: *the 26th Chinese Control and Decision Conference*, Changsha, China, May 2014.