Ryan M. Mohr

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EDUCATION

Ph.D. in Mechanical Engineering *June 2014*
University of California, Santa Barbara, CA, USA
Emphasis in Dynamics, Controls, and Robotics
Studies in Spectral Theory & Operator Theory, Ergodic Theory & Quantitative Recurrence
Dissertation Title: *Spectral Properties of the Koopman Operator in the Analysis of Nonstationary Dynamical Systems*
Doctoral Committee: Igor Mezić (Chair), Bassam Bamieh, Jeffrey Moehlis, Mihai Putinar

Bachelors of Science, *summa cum laude* *May 2006*
Department of Mechanical Engineering
Virginia Commonwealth University, Richmond, VA, USA
Majors: (1) Mechanical Engineering, (2) Physics
Minor: Mathematics

RESEARCH INTERESTS

Operator Methods in Dynamical Systems, Spectral Theory, Mathematical Analysis, Functional Analysis, Data-Driven Methods, Ergodic Theory

RESEARCH EXPERIENCE

Postdoctoral Researcher *October 2014 – Present*
Advisor: Prof. Igor Mezić
Dept. of Mech. Engineering, Univ. of California, Santa Barbara, Santa Barbara, CA 93106, USA

Assistant Specialist *July 2014 – Sept 2014*
Advisor: Prof. Igor Mezić
Dept. of Mech. Engineering, Univ. of California, Santa Barbara, Santa Barbara, CA 93106, USA

Graduate Student Researcher *July 2007 – June 2014*
Advisor: Prof. Igor Mezić
Dept. of Mech. Engineering, Univ. of California, Santa Barbara, Santa Barbara, CA 93106, USA

Undergraduate Laboratory/Research Assistant *Aug. 2005 – Aug. 2006*
Advisor: Prof. Kam Leang
Control and Mechatronic Systems Laboratory, Dept. of Mechanical Engineering, Virginia Commonwealth University, Richmond, Virginia 23284, USA

Undergraduate Research Assistant *2004 – 2005*
Advisors: Prof. Paul Ratz (VCU School of Medicine) & Prof. John Speich (VCU Dept. of Mech. Eng.)

Smooth Muscles Laboratory, Dept. of Chemistry and Molecular Biology, VCU School of Medicine, Richmond, VA 23298, USA

TEACHING EXPERIENCE

Teaching Assistant *Sept 2006 – June 2012*

Dept. of Mechanical Engineering, Univ. of California, Santa Barbara, Santa Barbara, CA 93106, USA

- Six academic quarters
- Directed laboratory sections, held office hours, wrote homework and solutions, graded assignments, developed lectures for the class's weekly review section, filled in as class lecturer.
  - ME 104 – Mechatronics
  - ME 106A – Advanced ME Lab
  - ME 156B – Mechanical Engineering Design II
  - ME 163 – Engineering Mechanics: Vibrations (Lead TA). Advised and managed two other TA's and two graders in addition to normal TA duties.
  - ME 169 – Nonlinear Phenomena (twice). Cross-listed class in Physics, Mechanical Engineering, and Electrical Engineering.

PROFESSIONAL EXPERIENCE

Advanced Fiber Systems BSME Cooperative Education Engineer *June 2004 – Aug. 2005*

Spruance Plant, DuPont, Richmond, VA 23234, USA

- **Kevlar SBU**
- **Nomex SBU**

PUBLICATIONS

Articles & Theses

[1] R. Mohr and I. Mezić. "Searching for Targets of Nonuniform Size Using Mixing Transformations: Constructive Upper Bounds and Limit Laws". In: *Journal of Nonlinear Science* (Mar. 2015), pp. 1–37. DOI: 10.1007/s00332-015-9240-2.

[2] R. M. Mohr. "Spectral properties of the Koopman operator in the analysis of nonstationary dynamical systems". PhD thesis. University of California, Santa Barbara, May 2014.

[3] R. Mohr. "Construction of eigenfunctions for scalar-type operators via Laplace averages with connections to the Koopman operator". In: *arXiv.org* (Mar. 2014). Submitted to Ergodic Theory & Dynamical Systems, pp. 1–25. arXiv: 1403.6559v1 [math.SP].

[4] M. Budisic, R. Mohr, and I. Mezić. "Applied Koopmanism". In: *Chaos* 22.4 (2012), p. 047510. DOI: 10.1063/1.4772195.

[6] P. Hollberg and R. Mohr. "Design for Six Sigma and product portfolio optimization". In: *Six Sigma Forum Magazine* 7.1 (Nov. 2007), pp. 13–19.

[8] J. Speich et al. "ROK-induced cross-link formation stiffens passive muscle: reversible strain-induced stress softening in rabbit detrusor". In: *American journal of physiology Cell physiology* 289.1 (July 2005), pp. C12–21. DOI: 10.1152/ajpcell.00418.2004.

Conference Proceedings

[5] R. Mohr and I. Mezić. "The use of ergodic theory in designing dynamics for search problems". In: *49th IEEE Conference on Decision and Control*. Atlanta, GA, USA, Dec. 2010, pp. 7300–7307. DOI: 10.1109/CDC.2010.5718129.

[7] S. Ashley et al. "Precise positioning of SMA actuator using iterative control". In: *Actuator 2006*. Bremen, Germany, June 2006.

CONFERENCES, TALKS, & WORKSHOPS

- Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany, *Feb. 7 – 13, 2016*
  Mini-Workshop: *Applied Koopmanism*
- SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, USA *May 17 – 21, 2015*
  Talk title: *Generalized Laplace Analysis and Spaces of Observables for the Koopman Operator*
- SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, USA *May 19 – 23, 2013*
  Talk title: *Analysis of network traffic matrices via spectral properties of the Koopman operator*
- SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, USA *May 22 – 26, 2011*
  Talk title: *Low-dimensional models and anomaly detection for TCP-like networks using the Koopman operator*
- 49th IEEE Conference on Decision and Control, Atlanta, GA, USA *Dec. 15 – 17, 2010*
  Talk title: *The use of ergodic theory in designing dynamics for search problems*
- SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, USA *May 17 – 21, 2009*
  Talk title: *Designing search dynamics robust under sensor uncertainty*
- Dynamics Days 2008, Knoxville, TN, USA *Jan. 3-6, 2008*
  Attendee
- CRM Workshop on *Chaos and Ergodicity in Realistic Hamiltonian Systems* *Dec. 11 – 14, 2007*
  Centre De Recherches Mathématiques, Montréal, Québec, Canada
  Attendee
- DARPA, Robust Uncertainty Analysis Workshop, CalTech, Pasadena, CA, USA *Oct. 11 – 12, 2007*
  Talk title: *Search Algorithms and Chaotic Dynamics*
- SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, USA *May 28 – June 1, 2007*
- Virginia Commonwealth University, School of Engineering's Commencement Ceremony May 2006
  Invited Speaker

ORGANIZING

ARO MURI Grant kickoff meeting *November, 6 2014*
Project: *New Theoretical and Experimental Methods for Predicting Fundamental Mechanisms of Complex Chemical Processes*
Loma Peloma Center, University of California, Santa Barbara, CA, USA

HONORS

Outstanding Teaching Assistant for the Academic Year 2012/13 *June 2013*
Department of Mechanical Engineering, Univ. of California, Santa Barbara

Best Physics Student *2005*
Department of Physics, Virginia Commonwealth University
Department academic award.

National Dean's List, 2003-2004 Edition *2004*

National Dean's List, 2002-2003 Edition *2003*

Dean's List *2001–2006*
Virginia Commonwealth University
All academic quarters as full-time student.

Henrico County Scholarship *Aug. 2001 – Aug. 2006*
Virginia Commonwealth University, School of Engineering
Merit scholarship for full tuition and fees.

MEMBER OF PROFESSIONAL SOCIETIES

Society of Industrial and Applied Mathematics (SIAM)
American Mathematical Society (AMS)
Tau Beta Pi, National Engineering Honor Society, Member

COMPUTER SKILLS

(4) Very Experienced, (3) Experienced, (2) Somewhat Experienced, (1) Novice

Mac (4), Unix (2), Windows (2), MATLAB (4), C/C++ (2), Python (1), LaTeX (3), LabView (2), Excel/Visual Basic (2)