

MICHAEL MARCONDES DE FREITAS

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EDUCATION

Rutgers University, New Brunswick, NJ, USA

2014 Ph.D in Mathematics

Thesis: *A Class of input/output random systems: monotonicity and a small-gain theorem*

Advisor: Dr. Eduardo D. Sontag

Universidade de Brasília, Brasília, DF, Brazil

2008 Master's in Mathematics

Dissertation: *"Symmetry, compactness, and multiplicity of solutions for a semilinear, elliptic problem in \mathbb{R}^n "* (in Portuguese; original title: *Simetria, compacidade e multiplicidade de soluções para um problema elíptico semilinear em \mathbb{R}^n*)

Advisor: Dr. Liliane de Almeida Maia

2006 Bachelor's in Mathematics

RESEARCH EXPERIENCE

University of Copenhagen, Copenhagen, Denmark

2014–2016 Postdoctoral Researcher

Area: Reaction network theory; model reduction and qualitative properties

Mentors: Dr. Carsten Wiuf and Dr. Elisenda Feliu

PUBLICATIONS AND PREPRINTS

- [6] **MMF**, Carsten Wiuf, and Elisenda Feliu. *Intermediates and Generic Convergence to Equilibria*, 2016. Submitted.
- [5] **MMF**, Elisenda Feliu, and Carsten Wiuf. Intermediates, Catalysts, Persistence, and Boundary Steady States. *Journal of Mathematical Biology*, 2016.
- [4] **MMF** and Eduardo D. Sontag. A Small-Gain Theorem for Random Dynamical Systems with Inputs and Outputs. *SIAM J. Control Optim.*, 53(4):2657–2695, 2015.
- [3] **MMF**. *A class of input/output random systems: Monotonicity and a small-gain theorem*. ProQuest LLC, Ann Arbor, MI, 2014. Thesis (Ph.D.)–Rutgers The State University of New Jersey - New Brunswick.
- [2] **MMF** and Eduardo D. Sontag. Random dynamical systems with inputs. In *Nonautonomous dynamical systems in the life sciences*, volume 2102 of *Lecture Notes in Math.*, pages 41–87. Springer, Cham, 2013.
- [1] **MMF** and Eduardo D. Sontag. A class of random control systems: Monotonicity and the convergent-input convergent-state property. In *Proc. American Control Conference*, pages 4564–4569, 2013.

PRESENTATIONS

Spring 2016 Obtaining Qualitative Properties of Reaction Networks from Simplified Models. *2016 Dynamical Systems Interdisciplinary Network Retreat*, Kollo-Kolle Koferncehotel, Værlose, Denmark.

- Winter 2016 Obtaining Qualitative Properties of Chemical Reaction Networks from Simplified Models. *2016 Joint Mathematical Meetings—AMS Session on Mathematical Biology and Related Fields, II*, Washington State Convention Center, Seattle, WA.
- Fall 2015 A Model Simplification Approach to Qualitative Properties of Reaction Networks. *Statistics and Probability Theory Monday Lunch Seminar*, University of Copenhagen.
- Summer 2015 A Model Simplification Approach to Persistence. *Workshop on Mathematical Trends in Reaction Network Theory*, University of Copenhagen.
- Spring 2015 Obtaining persistence from simplified models. *25th Annual MASAMB Workshop*, University of Helsinki.
- Summer 2014 Sistemas dinâmicos aleatórios com entrada e saída: monotonicidade, e um teorema de ‘ganho pequeno’ (in Portuguese). *Seminário de Análise*, Universidade de Brasília.
- Spring 2014 Existence and uniqueness of an invariant point, and global attractiveness for a class of nonlinear, random difference equations. *AMS Spring Eastern Sectional Meeting—Special Session on Difference Equations and Applications*, University of Maryland-Baltimore County.
- Fall 2013 Monotone random i/o systems, and a small-gain theorem. *Computational and Applied Mathematics Seminar*, Rutgers University.
- Monotone random dynamical systems. *Math Club*, California State University-Los Angeles.
- Summer 2013 A class of random control systems: Monotonicity and the convergent-input convergent-state property. *2013 American Control Conference*, Renaissance Washington, DC.
- Spring 2013 A Converging input/converging state for monotone random dynamical systems with inputs. *Graduate Student Analysis Seminar*, Rutgers University.
- A dynamical proof of Van der Waerden’s Theorem. *Graduate Pizza Seminar*, Rutgers University.
- Fall 2012 Controlled dynamical systems, monotonicity, and a small-gain theorem. *Graduate Student Analysis Seminar*, Rutgers University.
- Fall 2011 Counterexamples in Real Analysis. *Graduate Pizza Seminar*, Rutgers University.
- Fall 2010 A Frustrating fact of Social Choice Theory. *Graduate Pizza Seminar*, Rutgers University.
- Spring 2010 The irrational number that cost a man his life. *Graduate Pizza Seminar*, Rutgers University.
- Fall 2009 Uniqueness and non-uniqueness for solutions to ordinary differential equations. *Graduate Pizza Seminar*, Rutgers University.

SHORT-TERM VISITS

- Fall 2013 September 9th–13th. *Department of Mathematical Sciences, Florida Atlantic University*. Worked with Dr. Yuan Wang on ideas for formulating a theory of input-to-state stability for random dynamical systems with inputs and outputs.

TEACHING EXPERIENCE**University of Copenhagen** **2014–2015****Teaching Assistant:** ran computer lab and exercise sessions:

NMAK14024U: Stochastic Models for Genetic Data	Spring 2015
NMAA05009U: Mathematical Modeling	Fall 2014

Rutgers University **2011–2014****Course Instructor:** designed syllabus; developed course and assessment materials; planned and taught lectures; set up and managed class website; graded exams and assignments; assigned final grades:

Math 106: The Mathematics of Money	Summer 2014
Math 477: Mathematical Theory of Probability	Summer 2013
Math 354: Linear Optimization	Fall 2012
Math 250: Introductory Linear Algebra	Summer 2012

Recitation Instructor: helped develop course and assessment materials; taught recitation sessions; set up and managed class website; graded exams and assignments:

Math 244: Differential Equations for Engineering and Physics	Spring 2012
Math 136: Calculus II for the Life/Social Sciences	Fall 2011
Math 152: Calculus II for the Mathematical and Physical Sciences	Spring 2011

Universidade de Brasília **2003–2007****Teaching Assistant:** helped design syllabus; co-developed course and assessment materials; helped teach lectures:

MAT 117412: Introductory Measure Theory and Integration	Fall 2007
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Peer Mentor: co-ran workshop sessions; helped develop course materials; graded assignments:

MAT 113301: Differential Equations I	Spring 2006
MAT 113069: Complex Variables I	Spring 2005
MAT 113051: Calculus III	Fall 2004
MAT 113051: Calculus III	Spring 2004
MAT 113034: Calculus I	Spring 2003

MENTORING EXPERIENCE**Rutgers University** **2010–2013****Research Experience for Undergraduates (REU)** **Summer 2013**Co-mentored a then Rutgers University junior, Andre Gabriel Marquez, during the DIMACS REU 2013 (<http://reu.dimacs.rutgers.edu/>). Project was on a dynamical systems-approach to machine translation.**Directed Reading Program in Mathematics:** Guided undergraduate students through semester-long, independent studies of topics in mathematics (<http://www.math.rutgers.edu/drps>).

HariPriya Chakraborty	Spring 2013
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Topics in Ergodic Number Theory: recurrence theorems and arithmetic progressions

Textbook: Manfred Einsiedler and Thomas Ward; *Ergodic Theory: With a View Towards Number Theory*. Springer, 2012.

Haripriya Chakraborty

Fall 2012

Topics in Axiomatic Set Theory: the Axiom of Choice

Textbook: Karel Hrbacek and Thomas J. Jech; *Introduction to Set Theory*. CRC Press, 1999.

David Feinblum

Spring 2011

Topics in Real Analysis: counterexamples in Real Analysis

Textbook: Bernard R. Gelbaum and John M.H. Olmsted; *Counterexamples in Analysis*. Dover Publications, 2003.

David Feinblum

Fall 2010

Topics in Axiomatic Set Theory: construction of number systems

Textbook: Herbert B. Enderton; *Elements of Set Theory*. Academic Press, 1977.

Abdelrahman Mohamed

Summer 2010

Topics in Real Analysis: Fourier Series and Weierstrass Approximation Theorem

Textbook: Edward C. Titchmarsh; *The Theory of Functions*. Oxford University Press, 1976.

ACADEMIC SERVICE

Reviewed manuscripts for the **Society for Industrial and Applied Mathematics (SIAM) Journal on Control and Optimization (SICON)** and the **International Journal of Control**. (2013–present)

Co-organized (with principal investigator Professor Susanne Ditlevsen) the **2016 Dynamical Systems Interdisciplinary Network (DSIN) Retreat**, a yearly two-day symposium for graduate students and scholars doing research at the University of Copenhagen under the DSIN interdisciplinary grant. (Spring 2016)

Judge for the **MAA Student Poster Session** at the Joint Mathematics Meetings. Rated undergraduate research poster presentations in mathematical biology. (Winter 2016)

Member of the **International Student Services Committee** of the Centers for Global Advancement and International Affairs (GAIA Centers) at Rutgers University (Rutgers). The committee was an University-wide initiative to identify issues faced by international students, discuss solutions, and make recommendations to University executives. (Fall 2012–Summer 2014)

Member of the **International Student Affairs Committee (ISAC)** of the Graduate Student Association (GSA) at Rutgers. Co-organized events such as the I and II ISAC Arts Fairs, field trips, orientation events, and other activities targeting the international graduate student community at Rutgers. (Fall 2012–Summer 2014)

Member of the **Directed Reading Program** committee in the Department of Mathematics at Rutgers. Coordinated the pairing of undergraduate students with graduate student mentors for semester-long independent studies of topics in mathematics, organized end-of-term seminars for students to present their work. (Summer 2012–Summer 2014)

Co-organized the **Open House for Prospective Graduate Students** of the Department of Mathematics at Rutgers. Co-designed the schedule for the open house with the Graduate Director and other students, coordinated the participation of current graduate students, and oriented prospective students. (**Spring 2013** and **Spring 2014**)

Volunteered for **International Student Orientation**, ran by the Center for Global Services (formerly known as “Center for International Faculty and Student Services”) at Rutgers. Helped organize and run information sessions and social activities for entering international students; worked with various administrative offices such as Health Services and Residence Life. (**Summer 2009, Spring 2010, Summer 2010, Summer 2011, Spring 2012, Summer 2012, Summer 2013** and **Spring 2014**)

Volunteered for **International Teaching Assistant Orientation** at Rutgers. Facilitated discussions introducing new international TA’s to the cultural issues involved in teaching at an American institution. (**Summer 2011, Summer 2012** and **Summer 2013**)

Volunteer/Captain Ambassador for Rutgers University **Commencement Ceremony**. Managed volunteers and helped coordinate the flow of students and attendees at the event. (**Spring 2012** and **Spring 2013**)

Judge for the **Aresty Undergraduate Research Symposium** at Rutgers. Rated undergraduate research poster presentations in mathematics and natural sciences. (**Spring 2012** and **Spring 2013**)

SEMINARS AND CERTIFICATES

Introduction to University Pedagogy Certificate. Week-long, intensive course introducing participants to various pedagogical principles such as student activation and dialogic discourse. (Department of Science Education, University of Copenhagen, May 2015)

‘Preparing for the Professoriate’ Certificate. Awarded to graduate students who attended at least four sessions in a series of hour-long workshops offered throughout the academic year covering various teaching methodologies. (Teaching Assistant Project (TAP), Rutgers University, 2014)

Master Certificate in Theory, Harmony and Ear Training. 24 credits. (Berkleemusic Online Extension School of the Berklee College of Music, 2013)

Introduction to Online and Hybrid Teaching Seminar. 12-week long, hybrid seminar covering theoretical, pedagogical, and practical issues involved in teaching online and hybrid courses. (TAP, Rutgers University, Spring 2013)

‘Best Practices in Assessment’ Certificate. Awarded to graduate students who attended at least four sessions in a series of hour-long workshops offered throughout the academic year covering the topic of assessment. (TAP, Rutgers University, 2012)

Designing Your Own Course Seminar. 12 weekly 2-hour sessions covering each aspect of developing a college course, from establishing goals for the course to designing the syllabus, materials, assignments, lesson plans, etc. (TAP, Rutgers University, Fall 2012)

Introduction to College Teaching Seminar. 12 weekly 2-hour sessions exploring a wide range of issues pertaining to higher education and college teaching. (TAP, Rutgers University, Spring 2011)

OTHER PROFESSIONAL DEVELOPMENT

Machine Learning Foundations: A Case Study Approach, by University of Washington. Instructors: Dr. Carlos Guestrin and Dr. Emily Fox. (Coursera, February 5th – April 4th, 2016)

Python Data Structures, by University of Michigan. Instructor: Dr. Charles Severance. (Coursera, January 18th – March 14th, 2016)

Getting Started with Python, by University of Michigan. Instructor: Dr. Charles Severance. (Coursera, December 7th, 2015 – February 1st, 2016)

MAA Minicourse: **Humanistic Mathematics**, presented by presented by Gizem Karaali (Pomona College) and Eric Marland (Appalachian State University) at the 2016 Joint Mathematics Meetings. (Seattle, WA, Winter 2016)

Learning How to Learn: Powerful mental tools to help you master tough subjects, by University of California, San Diego. Instructors: Dr. Barbara Oakley and Dr. Terrence Sejnowsky. (Coursera, January 2nd – February 2nd, 2015)

MAA Minicourse: **Directing Undergraduate Research**, presented by Aparna Higgins (University of Dayton) at the 2014 Joint Mathematics Meetings. (Baltimore, MD, Winter 2014)

AWARDS AND FELLOWSHIPS

2013 **Student Travel Award**, American Control Conference

2010 **Graduate Pizza Seminar Award** (Fall), Rutgers University

q-bio Summer School Travel Award, Los Alamos National Laboratory
2008–2009 **Excellence Fellowship**, Rutgers University
2006–2008 **Master Candidate/CNPq Fellowship**, Universidade de Brasília
2007 **IRES/CNPq Summer Research Fellowship**, Universidade de São Paulo-São Carlos
2005–2006 **PIBIC/CNPq Fellowship**, Universidade de Brasília
2003–2005 **PET/SESu Fellowship**, Universidade de Brasília

MEMBERSHIP

Giving What We Can (since June/2014)
Mathematical Association of America (since November/2013)

VOLUNTEER SERVICE

Volunteered as organizer for the “Copenhagen chapter” of the **Effective Altruism Movement**. Co-organized events, helped raise more than \$ 10,000 to effective charities fighting global poverty, co-managed social media, ran the social meetup. (**Fall 2014–Summer 2016**)

Volunteered as “board game guru” for **Bastard Café**, a board games café in Copenhagen. Assisted customers in board game-related matters, ran board game tutorials, co-organized board game meetups. (**Fall 2014–Summer 2016**)

Volunteered for the Rutgers chapter of **Giving What We Can**, a non-profit conducting charity evaluations, and encouraging people to incorporate philanthropy into their lifestyle. Co-organized and helped execute events and fundraisers in the New Brunswick Campus of Rutgers. (**Spring 2011–Summer 2014; President: Fall 2013–Summer 2014**)

Volunteered for **Effective Fundraising**, a non-profit doing research on fundraising methods, and applying them to raise money for top-rated charities. Edited grant applications and online material, and managed the Facebook page. (**Summer 2013–Spring 2014**)

SKILLS

Languages: Portuguese (native), English (fluent), Danish (basic), Spanish (basic)
Markup Languages: \LaTeX , HTML
Programming: Arduino, Maple, Python; Machine Learning