

Personal Details

Name	Boumediene Hamzi
University Address	Department of Mathematics, AlFaisal University, Riyadh, Saudi Arabia
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Citizenship	US Citizen

Employment and Professional Qualifications

Since 08/2015	Associate Professor at the Department of Mathematics of AlFaisal University (Riyadh, Saudi Arabia).
01/2011 – 12/2015	Marie Curie Fellow at the Department of Mathematics of Imperial College London (London, UK), Koç University (Istanbul, Turkey).
03/2015 – 06/2015	Member at the Fields Institute for Research in Mathematical Sciences (Toronto, Canada).
08/2007 – 12/2010	Visiting Assistant Professor at the Department of Mathematics of Duke University (Durham, NC).
01/2007 – 06/2007	Member at the Mathematical Sciences Research Institute (Berkeley, CA).
07/2003 – 12/2006	Research Assistant Professor at the Department of Mathematics of the University of California at Davis (Davis, CA).
01/2002 – 06/2003	INRIA Research Fellow at the Department of Mathematics of UC Davis (Davis, CA).
05/ 2002	French Qualification for Associate Professorship in Applied Mathematics and Applications of Mathematics (Qualification aux fonctions de Maître de Conférences, CNU section: 26).
09/2000 – 08/2001	Temporary Assistant Professor (Attaché Temporaire d’Enseignement et de Recherche) at the University of Paris-Sud (Paris, France).

Education

2001	Ph.D. in Applied Mathematics (Control Theory), University of Paris-Sud (France) with distinction. Title of thesis: “ <i>Analysis and Control of Nonlinear Systems with Uncontrollable Linearization within the Framework of Bifurcation Theory.</i> ” Advisors: W.Kang (Naval Postgraduate School, USA) and D. Normand-Cyrot (University of Paris-Sud, France).
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Research Interests

Statistical Learning for Dynamical Systems, Normal Forms and Bifurcations, Lyapunov Techniques for Dynamical Systems.

Teaching Experience

2015 – 2016	AlFaisal University: Ordinary and Partial Differential Equations (Mat 213), Linear Algebra and its Applications (Mat 212).
2012	Imperial College London: Lecture Series on Learning Theory.
2007 – 2010	Duke University: Ordinary and Partial Differential Equations (Mat 108), Elementary Differential Equations (Mat 131), Qualitative Behavior of Nonlinear Ordinary Differential Equations (Mat 132S).
2003 – 2006	University of California at Davis: Differential Calculus in Banach Spaces (Math 127C), Calculus (Mat 21B, Mat 21C), Short Calculus (Mat 16A, Mat 16B, Mat 16C).
2000 – 2001	University of Paris-Sud: Mathematical Methods for Control Systems and Signal Processing, Control Theory (State Space Techniques for Linear Systems)

Awards and Fellowships

01/2011 – 12/2015	Marie Curie Fellowships.
10/2011 – 06/2012	EPSRC Bridging the Gap Internal Grant on “ Kernel Methods for Detecting Impending Instability with Application to Power Systems”.
01/2002 – 12/2002	Award from INRIA (The French National Institute for Research in Computer Science and Control).

Student Supervision

2012	Prince Singh, “Kernel Methods for Linear Partial Differential Equations”, M.Sc. in Applied Mathematics, Imperial College London.
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Special Skills

Languages	Arabic (native), English (fluent), French (fluent), Turkish (basic).
Computer Skills	Matlab, Python.

Publications

Theses

- [BHPhD] B. Hamzi (2001). *Analyse et commande des systèmes non linéaires non commandables en première approximation dans le cadre de la théorie des bifurcations*, Ph.D. Thesis, University of Paris XI-Orsay, France.
- [BHdea] B. Hamzi (1997). *Formes de Poincaré des systèmes commandés à temps discret avec bifurcations*, M.Sc. Thesis, University of Paris XI-Orsay, France.

In Preparation

- [1] B. Hamzi and A. C. Subramanian. Data-based methods for Lorenz-86: A simple atmospheric model.

Submitted

- [2] P. Giesl, B. Hamzi, M. Rasmussen, K. Webster. Approximation of Lyapunov Functions from Noisy Data, <http://arxiv.org/abs/1601.01568>.
- [3] B. Hamzi and E. Abed. Local Participation Factors for Nonlinear Systems.
- [4] F. Colonius and B. Hamzi. Kernel Methods for Linear Discrete-Time Equations.
- [5] J. Bouvrie and B. Hamzi. Kernel Methods for the Approximation of Some Key Quantities of Nonlinear Systems.

Refereed Articles

- [6] J. Bouvrie and B. Hamzi (2015), *Kernel Methods for the Approximation of Nonlinear Systems*, to appear in SIAM J. Control & Optimization, <http://arxiv.org/abs/1108.2903>.
- [7] B. Hamzi and E. Abed (2014), Local Mode-in-State Participation Factors for Nonlinear Systems, in Proc. of the 53rd IEEE Conference on Decision and Control.
- [8] B. Hamzi, J. Lamb and D. Lewis (2014), *A Characterization of the Normal Forms of Nonlinear Control Systems*, Journal of Dynamical and Control Systems, <http://arxiv.org/abs/1303.7245>.
- [9] J. Bouvrie and B. Hamzi (2013), *Kernel Methods for the Model Reduction of Nonlinear Control Systems*, in Proc. of the 4th International Workshop on Model Reduction in Reacting Flows, San Francisco (CA).
- [10] J. Bouvrie and B. Hamzi (2012), *Empirical Estimators for the Controllability Energy and Invariant Measure of Stochastically Forced Nonlinear Systems*, in Proc. of the 2012 American Control Conference (long version at <http://arxiv.org/abs/1204.0563>).
- [11] J. Bouvrie and B. Hamzi (2010). *Balanced Reduction of Nonlinear Control Systems in Reproducing Kernel Hilbert Space*, in Proc. 48th Annual Allerton Conference on Communication, Control, and Computing, pp. 294-301. <http://arxiv.org/abs/1011.2952>.
- [12] B. Hamzi and A. J. Krener, *The Controlled Center Systems*, IEEE Transactions on Automatic Control, **52**, 11, 2188 - 2192, 2007.
- [13] B. Hamzi, A. J. Krener and W. Kang, *The Controlled Center Dynamics of Discrete-Time Control Bifurcations*, Systems and Control Letters, **55**, 7, 585-596, 2006.
- [14] A. J. Krener, W. Kang, B. Hamzi and I. A. Tall, *Control Singularities of Codimensions One and Two*, Proc. of the 1st IFAC Conference on the Analysis and Control of Chaotic Systems, 2006 [invited paper].
- [15] W. Kang, B. Hamzi, and A.J. Krener, *On the Convergence and Behavior of Three Dimensional Normal Forms*, Proc. of the 1st IFAC Conference on the Analysis and Control of Chaotic Systems, 2006 [invited paper].
- [16] B. Hamzi, and A. J. Krener, *The Controlled Center Systems*, Proc. of 45th IEEE Conference on Decision and Control, pp. 6414 - 6418, 2006.
- [17] B. Hamzi, W. Kang and A. J. Krener, *The Controlled Center Dynamics*, SIAM J. on Multiscale Modeling and Simulation, **3**, 4, 838-852, 2005.
- [18] A. J. Krener, W. Kang, B. Hamzi and I. A. Tall, *Low Codimension Control Singularities in New Directions and Applications in Control Theory*, W. P. Dayawansa, A. Lindquist and Y. Zhou eds., pp. 181-192, 2005.
- [19] B. Hamzi, W. Kang and J.-P. Barbot, *Analysis and Control of Hopf Bifurcations*, SIAM J. on Control and Optimization, **42**, 6, 2200-2220, 2004.
- [20] B. Hamzi, W. Kang, and A. J. Krener, *Stabilization of Discrete-Time Systems with a Fold or Period Doubling Control Bifurcation*, Proc. of the 16th IFAC World Congress (CDROM), 2004.
- [21] B. Hamzi, W. Kang, and A. J. Krener, *The Controlled Center Dynamics of Discrete-Time Control Bifurcations*, Proc. of the 6th IFAC symposium on Nonlinear Control Systems (NOLCOS'2004) (CDROM), 2004.
- [22] B. Hamzi and W. Kang, *Resonant Terms and Bifurcations of Nonlinear Control Systems with One Uncontrollable Mode*, Systems and Control Letters, **49**, pp. 267-278, 2003.
- [23] B. Hamzi, W. Kang, and A. J. Krener, *Control of Center Manifolds*, Proc. of the 42nd IEEE Conference on Decision and Control, **3**, 2065 - 2070, 2003.
- [24] B. Hamzi and I. A. Tall, *Normal Forms for Discrete-Time Control Systems*, Proc. of the 42nd IEEE Conference on Decision and Control, **2**, 1357 - 1361, 2003.
- [25] B. Hamzi and A. J. Krener, *Practical Stabilization of Systems with a Fold Control Bifurcation* in New Trends in Nonlinear Dynamics and Control and their Applications, W. Kang, C. Borges and M. Xiao eds., pp. 34-48, Springer, Berlin, 2003.

- [26] B. Hamzi, *Analysis and Stabilization of nonlinear systems with a zero-Hopf control bifurcation*, Proc. of the 41st IEEE Conference on Decision and Control, **4**, pp. 3912-3917, 2002.
- [27] B. Hamzi, S. Monaco, and D. Normand-Cyrot, *Quadratic stabilization of systems with period doubling bifurcation*, Proc. of the 41st IEEE Conference on Decision and Control, **4**, pp. 3907-3911, 2002.
- [28] B. Hamzi, J.-P. Barbot, S. Monaco, and D. Normand-Cyrot, *Nonlinear Discrete-Time Control of Systems with a Naimark-Sacker Bifurcation*, Systems and Control Letters, **44**, pp. 245-258, 2001.
- [29] B. Hamzi, *Quadratic Stabilization of Nonlinear Control Systems with a Double-Zero Control Bifurcation*, Proc. of the 5th IFAC symposium on Nonlinear Control Systems (NOLCOS'2001), pp. 161-166, 2001 [invited paper].
- [30] B. Hamzi, J.-P. Barbot, S. Monaco, and D. Normand-Cyrot, *Normal form versus Naimark Sacker bifurcation control*, Proc. of the 5th IFAC symposium on Nonlinear Control Systems (NOLCOS'2001), pp. 167-172, 2001 [invited paper].
- [31] B. Hamzi, *Some Results on Inverse Optimality Based Designs*, Systems and Control Letters, **43**, pp. 239-246, 2001.
- [32] B. Hamzi and L. Praly, *Ignored Input Dynamics and a new Characterization of Control Lyapunov Functions*, Automatica, **37**, pp. 831-841, 2001.
- [33] B. Hamzi and W. Kang, *Resonant terms in a class of systems with stationary bifurcations*, Proc. of the 40th IEEE Conference on Decision and Control, pp. 722-727, 2001.
- [34] B. Hamzi, W. Kang and J.-P. Barbot, *On the Control of Hopf Bifurcations*, Proc. of the 39th IEEE Conference on Decision and Control, Sydney, Australia, pp. 1631-1636, 2000 [invited paper].
- [35] B. Hamzi, J.-P. Barbot and W. Kang, *Stabilization of Nonlinear Discrete-Time Control Systems with uncontrollable Linearization*, Proc. of the 3rd IEEE/IMACS Multiconference on Circuits, Systems, Communications and Computers, pp. 4581-4586, 1999.
- [36] B. Hamzi, J.-P. Barbot and W. Kang, *Normal Forms for Discrete-Time Parameterized Systems with Uncontrollable Linearization*, Proc. of the 38th IEEE Conference on Decision and Control, pp. 2035-2039, 1999.
- [37] B. Hamzi, J.-P. Barbot and W. Kang, *Bifurcation for Discrete-Time Parameterized Systems with Uncontrollable Linearization*, Proc. of the 38th IEEE Conference on Decision and Control, pp. 684-688, 1999.
- [38] B. Hamzi and L. Praly, *Ignored Input Dynamics and a new Characterization of Control Lyapunov Functions*, Proc. of the 5th European Control Conference, 1999.
- [39] B. Hamzi, J.-P. Barbot and W. Kang, *Stabilization of Nonlinear Discrete-Time Control Systems with Uncontrollable Linearization in Modern Applied Mathematics Techniques in Circuits, Systems and Control*, N. Mastorakis ed., pp. 278-283, World Scientific and Engineering Society Press, 1999.
- [40] B. Hamzi, J.-P. Barbot and W. Kang, *Bifurcation and Topology of Equilibrium Sets for Nonlinear Discrete-Time Control Systems*, Proc. of the 4th IFAC symposium on Nonlinear Control Systems (NOLCOS'98), pp. 35-38, 1998.

Talks

• Invited Talks

- “Data-based methods for Lorenz-86: A simple atmospheric model”, The 9th CHAOS 2016 International Conference, London, May 2016.
- “Embedology for Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, Queen Mary- University of London, November 2014.
- “On Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, Koç University (Istanbul, Turkey), May 2014.
- “On Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, Bilkent University (Ankara, Turkey), May 2014.

- “On Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, Yildiz Technical University (Istanbul, Turkey), April 2014.
 - “On Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, Bogaziçi University (Istanbul, Turkey), February 2014.
 - “On Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, University of Augsburg (Germany), February 2014.
 - “On Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, METU (Ankara, Turkey), January 2014.
 - “On Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, Analysis & Geometry Seminar, School of Mathematical Sciences - Queen Mary, University of London, January 2013.
 - “On Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, Probability Seminar, Department of Mathematics, UMD, College Park, November 2012.
 - “Model Reduction of Nonlinear Control Systems in Reproducing Kernel Hilbert Space”, London Dynamical Systems Group (LDSG) Meeting, University of Surrey, May 2011.
 - “Balanced Model Reduction of Nonlinear Control Systems in Reproducing Kernel Hilbert Space”, Université de Tlemcen (Algeria), December 2010; Imperial College London, March 2011; University of Bath, January 2012.
 - “Normal Forms, Bifurcations, and the Center Manifold Theorem for Control Systems”, Applied Mathematics Seminar, Imperial College, May 2008.
 - “The Controlled Center Dynamics”, CMAP, École Polytechnique (Paris, France), May 2007; UC Santa-Cruz, May 2007; Iowa State University, February 2006.
 - “The Controlled Center Systems”, Louisiana State University, July 2005.
 - “Piecewise Linear Stabilization of Systems with Fold Control Bifurcation”, Symposium on “Computation, Control and Biological Systems”, Montana State University, Bozeman, Montana, July 2003.
 - “Practical Stabilization of Systems with a Fold Control Bifurcation”, Sixth Southern California Workshop on Nonlinear Control, UC San-Diego, May 2003.
- *Regular Talks*
 - “Kernel Methods for the Model Reduction of Nonlinear Systems”, Workshop on Data-Driven Model Order Reduction and Machine Learning (MORML 2016), Stuttgart, March 2016.
 - “Embedology for Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, SIAM Conference on Applications of Dynamical Systems, May 2015.
 - “Embedology for Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, University of Oxford, 02/2015; Fields Institute, 03/2015; University of Toronto, 03/2015; University of Ottawa, 03/2015; Concordia University, 03/2015; McMaster University (Hamilton, ON), 04/2015; University of Waterloo (Waterloo, ON), 04/2015.
 - “Empirical Estimators for Stochastically Forced Nonlinear Systems”, The American Control Conference, Montréal, June 2012.
 - “Preliminary Results on Control and Random Dynamical Systems in Reproducing Kernel Hilbert Spaces”, Workshop on Parameter Estimation for Dynamical Systems (PEDS-II), Eindhoven, June 2012.
 - “On Normal Forms for Nonlinear Hamiltonian Control Systems”, The SIAM Conference on Control and Its Applications, Baltimore (MD), July 2011.
 - “Model Reduction of Nonlinear Control Systems in Reproducing Kernel Hilbert Space”, The Tenth SIAM Conference on Control and Its Applications, Baltimore (MD), July 2011.
 - “A Simple Characterization of the Normal Forms of Nonlinear Control Systems”, The SIAM Conference on Control and Its Applications, Denver, Colorado, July 2009.
 - “A Data-Based Approach for the Model Reduction of Nonlinear Control Systems with Unstable Linearization”, The SIAM Conference on Control and Its Applications, San Francisco, California, June 2007.
 - “The Controlled Center Systems”, The SIAM Conference on Control and Its Applications, New Orleans, Louisiana, July 2005.
 - “Normal Forms for Discrete-Time Control Systems”, Symposium on “Normal Forms, Bifurcations and Chaos in Control Theory: From Theory to Applications”, École Centrale de Lille, Lille (France), September 2003.
 - “Control of Center Manifolds”, 42nd IEEE Conference on Decision and Control, Maui, Hawaii, December 2003.

- “Analysis and stabilization of nonlinear systems with a zero-Hopf control bifurcation”, 41st IEEE Conference on Decision and Control, Las-Vegas, December 2002.
- “Quadratic stabilization of systems with period doubling bifurcation”, 41st IEEE Conference on Decision and Control, Las-Vegas, December 2002.
- “Practical Stabilization of Systems with a Fold Control Bifurcation”, Symposium on “New Trends in Non-linear Dynamics and Control and their Applications”, Naval Postgraduate School, Monterey (CA), October 2002.

Research Visits and Workshops

- 03/2015-06/2015: Program and Workshops on “Statistical Inference, Learning and Models for Big Data” at the Fields Institute (Toronto).
- 05-06/2014: Workshop on “Stochastic equations for complex systems: Theory and applications”, University of Wyoming.
- 02/2014, 01/2015: Visiting Professor Fritz Colonius, University of Augsburg (Germany).
- Since 07/2007: Regular visits to Professor Jeroen Lamb, Department of Mathematics of Imperial College (London, United-Kingdom).
- 01/2007 – 05/2007: Program and Workshops on Dynamical Systems and Control Theory at the Mathematical Sciences Research Institute (Berkeley, CA).
- Since 08/2005: Regular visits to Professor Eyad Abed, Institute for Systems Research, University of Maryland in College-Park (MD, USA).
- 01/2004: Workshop on “Multiscale Model Development and Control Design”, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park (North Carolina, USA).
- 04/2001: Workshop on “Dynamics, Bifurcations and Control”, Irsee (Germany).
- 06/2000: Workshop on “Nonlinear Control in the Year 2000”, Paris (France).
- 08/1999 – 09/1999: Visiting Professor Wei Kang, Mathematics Department of the Naval Postgraduate School in Monterey (CA, USA).

Academic Services

- Member of the Program Committee of the 2013 and 2015 SIAM Conference on Control and its Applications (SIAM CT13 (San Diego, CA) and SIAM CT15 (Paris)).
- Organizer and Chair of two Sessions on “Nonlinear Systems” at The SIAM Conference on Control and Its Applications, San Diego (CA), July 2013.
- Organizer of the Sessions “Nonlinear Systems” and “Model Reduction of Nonlinear Control and Dynamical Systems” at The SIAM Conference on Control and Its Applications, Baltimore (MD), July 2011.
- Chair of the Session on “Nonlinear Systems” at The SIAM Conference on Control and Its Applications, Denver (CO, USA), July 2009.
- Coordinator of the “Control Group” during the programme on Dynamical Systems and Control Theory at the MSRI (Berkeley, CA) in 2007.
- Organization, with A.J. Krener, of two sessions “Model Reduction for Control and Dynamical Systems” at The SIAM Conference on Control and Its Applications, San Francisco (CA, USA), June 2007.
- Member of the International Program Committee of the 1st IFAC Conference on the Analysis and Control of Chaotic Systems, Reims, France, June 2006.
- Organization, with W. Kang, of one session “Bifurcations of Control Systems” at the 1st IFAC Conference on the Analysis and Control of Chaotic Systems, Reims, France, June 2006.
- Organization, with I.A. Tall, of two sessions “Normal Forms and Bifurcations for Control Systems” at the Sixth SIAM Conference on Control and Its Applications, New Orleans, Louisiana (USA), July 2005.
- Organization of two sessions “Bifurcations and Chaos”, “Stabilization of Nonlinear Systems” at the Third IEEE/IMACS Multiconference on Circuits, Systems, Communications and Computers, Athens (Greece), July 1999.
- Reviewer for IEEE transactions on Automatic Control, International Journal of Control, Automatica, European Journal of Control, International Journal of Signals and Systems, IEEE Transactions on Industrial Electronics, IEEE Conference on Decision and Control, IFAC World Congress, IFAC NOLCOS, IEEE Conference on Control Applications.