

FROM THE GUEST EDITORS



It is our heartfelt joy and honor to present to you a colorful collection of high quality and timely articles from a number of colleagues who have touched the amazing life of our beloved colleague and friend, Carlos Castillo-Chavez. This special issue was conceived to honor Carlos Castillo-Chavez's unparalleled contributions to mathematical research and education on the occasion of his 60th birthday. From his (very long and growing) short biography below and the table of content of this special issue, you can see his list of incredible accomplishments far exceeds the boundaries of mathematical research and education.

We would like to thank all contributing authors for their fine and interesting articles. We are equally grateful to the many anonymous referees for their timely and constructive reviews. We are especially thankful to Professor Yang Kuang, who suggested to us to publish this special issue in MBE, and for his continuous support throughout the process. Last but not the least, we are indebted to the impeccable production effort of the editorial staff of AIMS that made this special issue a reality.

Carlos Castillo-Chavez –Short Biography– 04-27-2013

Carlos Castillo-Chavez is a [Regents](#) Professor, a Joaquin Bustoz Jr. Professor of Mathematical Biology, and a Distinguished Sustainability Scientist at Arizona State University. His research program is at the interface of the *mathematical and natural and social sciences* with emphasis on (i) the role of dynamic social landscapes on disease dispersal; (ii) the role of environmental and social structures on the dynamics of addiction and disease evolution, and (iii) Dynamics of complex systems at the interphase of ecology, epidemiology and the social sciences. Castillo-Chavez

has co-authored over two hundred publications (see [goggle scholar citations](#)) that include journal articles and edited research volumes. Specifically, he co-authored a [textbook](#) in Mathematical Biology in 2001 (second edition in 2012); a volume (with [Harvey Thomas Banks](#)) on the use of mathematical models in [homeland security](#) published in SIAM's Frontiers in Applied Mathematics Series (2003); and co-edited volumes in the Series Contemporary Mathematics entitled "[Mathematical Studies on Human Disease Dynamics: Emerging Paradigms and Challenges](#)" (American Mathematical Society, 2006) and [Mathematical and Statistical Estimation Approaches in Epidemiology](#) (Springer-Verlag, 2009) highlighting his interests in the applications of mathematics in emerging and re-emerging diseases. Castillo-Chavez is a [member of the Santa Fe Institute's](#) external faculty, [adjunct professor](#) at Cornell University, and contributor, as a member of the Steering Committee of the "Committee for the Review of the Evaluation Data on the Effectiveness of NSF-Supported and Commercially Generated Mathematics Curriculum Materials," to a 2004 [NRC report](#). The CBMS workshop "Mathematical Epidemiology with Applications" lectures delivered by C. Castillo-Chavez and F. Brauer in 2011 have been published by SIAM in 2013.

Castillo-Chavez is the founding director of the [Mathematical, Computational and Modeling Sciences Center](#) and the graduate field in [applied mathematics](#) in the life and social sciences or [AMLSS](#) at ASU (07-01-2008). The AMLSS PhD degree has graduated 18 students, including 13 students who are members of underrepresented groups. He is also the Executive Director of the Mathematical and Theoretical Biology Institute or [MTBI](#) and The Institute for Strengthening the Understanding of Mathematics and Science or [SUMS](#). MTBI, established by Castillo-Chavez in 1996, was recognized as a "[Mathematics Program that Makes a Difference](#)" by the American Mathematical Society in 2007; MTBI was also recognized with a [2011 Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring](#). SUMS' efforts were recognized with a [Presidential Mentorship Award](#) in 2002.

Castillo-Chavez' efforts resulted in the [establishment](#) of the *David Blackwell and Richard Tapia Distinguished Lecture Series* in 2000 and the co-establishment of the [David Blackwell and Richard Tapia Award](#) two years later with [David Eisenbud](#). Castillo-Chavez spent 18 years at Cornell University (1985-2003) in the department of Biological Statistics and Computational Biology ([BSCB](#)) and over his last few years with a joint appointment in Theoretical and Applied Mechanics ([TAM](#)). Castillo-Chavez' recognitions include a Ford Foundation Postdoctoral Fellowship (1987), two White House Awards : *Presidential Faculty Fellowship Award* in 1992 and a [Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring](#) in 1997; the 2002 Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) [Distinguished Scientist Award](#); and the 2003 [Richard Tapia Award](#). Castillo-Chavez is the 12th recipient of the [American Mathematical Society Distinguished Public Service Award](#) (01-14-2010). In addition, [Castillo-Chavez](#) held a [Stanislaw M. Ulam Distinguished Scholar](#) position at the Center for Nonlinear Studies ([CNLS](#)) in Los Alamos National Laboratory in 2003. He was named honorary professor at Xi'an Jiaotong University in China (2004) and honorary professor at the School of Public Health, East Tennessee State University (2010). He has held a VIV appointment at Institute for Mathematics and its Applications or IMA (1998), a Cátedra Patrimonial, Instituto de Investigaciones en Matemáticas Aplicadas y Sistemas ([IIMAS](#)), Universidad Nacional Autónoma

de México (1998-1999), and visiting professorships at the Isaac Newton Institute for Mathematical Sciences, Cambridge, England (2003) and the Harvard School of Public Health (2012). Castillo-Chavez currently holds the appointment of Martin Luther King Jr. Professor at MIT (2012-2013) and was in residence at the Poincare Institute in the spring of 2013. He has been elected [fellow](#) of the American Association for the Advancement of Science (AAAS), the Society for Industrial and Applied Mathematics, the American College of Epidemiology and [Founding Fellow of the American Mathematical Society](#) (11-01-2012). Castillo-Chavez is the recipient of the [2007 AAAS Mentor award](#); has chaired or co-chaired 29 PhD committees (including those of 15 US Underrepresented Minorities (Latinos and African-American) and 10 women); he has mentored 23 postdoctoral researchers; and co-mentored over 200 undergraduates in research projects. Castillo-Chavez past committee memberships include: the Arizona Governor's P-20 Council's Mathematics Alignment Team in 2008-09; the advisory boards of the Statistical and Applied Mathematics Sciences Institute ([SAMSI](#)), Banff's International Research Station ([BIRS](#)), and the National Institute for Mathematical and Biological Synthesis ([NIMBioS](#)). He is a member of the National Research Council's Board of Higher Education and Workforce or [BHEW](#) (2009-2015); served in President Obama's [Committee on the National Medal of Science](#) (2010-2012); the President just re-appointed him for the 2013-2015 period. He was a co-director of the [National Alliance for Doctoral Studies in the Mathematical Sciences Alliance](#) (2010-2012). Castillo-Chavez' research and mentorship programs have been funded since 1988 by the National Science Foundation, the National Institutes of Health, the National Security Agency, the Sloan Foundation, the U.S. Department of Agriculture and the U.S. Department of Education as well as Arizona State University, Cornell University and Los Alamos National Laboratory.

Students Graduate Ph.D. Thesis

- [1] Jose Manuel Vega-Guzman, "Solution Methods for Certain Evolution Equations," Co-Director with Sergei K. Suslov, Ph.D thesis, Arizona State University, Arizona, United States, 2013.
- [2] Paula A. Gonzalez Parra, "Constrained Optimal Control for a Multi-Group Discrete Time Influenza Model," Co-Director with Martine Ceberio, Ph.D thesis, The University of Texas at El Paso, Texas, United States, 2012.
- [3] Irina Kareva, "Niche Construction, Sustainability and Evolutionary Ecology of Cancer," Co-Director with John Nagy, Ph.D thesis, Arizona State University, Arizona, United States, 2012.
- [4] Benjamin Morin, "Computational and Analytical Mathematical Techniques for Modeling Heterogeneity," Co-Director with David Edward Hiebeler, Ph.D thesis, Arizona State University, Arizona, United States, 2012.
- [5] David Murillo, "Cities in Ecology: Settlement Patterns and Diseases," Co-Director with John Martin Anderies, Ph.D thesis, Arizona State University, Arizona, United States, 2012.
- [6] Griselle Torres Garcia, "Size Structured Epidemic Models," Co-Director with Zhilan Feng, Ph.D thesis, Arizona State University, Arizona, United States, 2012.
- [7] Ricardo J Cordero-Soto, "Solvable Time-Dependent Models in Quantum Mechanics," Co-Director with Sergei K. Suslov, Ph.D thesis, Arizona State University, Arizona, United States, 2011.
- [8] Edme L Soho, "Immune Response in the Study of Infectious Diseases (Co-Infection) in an Endemic Region," Co-Director with Stephen Allen Wirkus, Ph.D thesis, Arizona State University, Arizona, United States, 2011.
- [9] Alicia Urdapilleta, "Theoretical Studies on a Two Strain Model of Drug Resistance: Understand, Predict and Control the Emergence of Drug Resistance," Ph.D thesis, Arizona State University, Arizona, United States, 2011.

- [10] Ana Luz Vivas, “Dynamics of a “SAIQR” Influenza Model,” Co-Director with Ernest Barany, Ph.D thesis, New Mexico State University, New Mexico, United States, 2011.
- [11] Edgar Diaz Herrera, “Diffusive Instability and Aggregation in Epidemics,” Ph.D thesis, Arizona State University, Arizona, United States, 2010.
- [12] Angela R. Ortiz Nieves, “Modeling the Transmission of Vancomycin-Resistant Enterococcus in Hospitals: A Case Study,” Co-Director with Harvey Thomas Banks, Ph.D thesis, Arizona State University, Arizona, United States, 2010.
- [13] Kevin Flores, “Multiscale Modeling of Cancer,” Co-Director with Yang Kuang, Ph.D thesis, Arizona State University, Arizona, United States, 2009.
- [14] Carlos Alan Torre, “Deterministic and Stochastic Metapopulation Models for Dengue Fever,” Co-Director with Priscilla Greenwood, Ph.D thesis, Arizona State University, Arizona, United States, 2009.
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- [16] Karen R. Rios-Soto, “Dispersal and Disease Dynamics in Populations with and without Demography,” Ph.D thesis, Cornell University, New York, United States, 2008.
- [17] Karyn Sutton, “Theoretical Studies on Pneumococcal Vaccination,” Ph.D thesis, Arizona State University, Arizona, United States, 2008.
- [18] Mustafa Erdem, “Epidemic in Structured Populations with Isolation and Cross-Immunity,” Ph.D thesis, Arizona State University, Arizona, United States, 2007.
- [19] Fabio Sanchez, “Studies in Epidemiology and Social Dynamics,” Ph.D thesis, Cornell University, New York, United States, 2007.
- [20] Eunha Shim, “Mathematical Models of Rotavirus Transmission in the Presence of Maternal Antibodies and Vaccination,” Ph.D thesis, Arizona State University, Arizona, United States, 2007.
- [21] Ariel Cintron-Arias, “Modeling and Parameter Estimation of Contact Processes,” Ph.D thesis, Cornell University, New York, United States, 2006.
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