

# Antonio Palacios

*Professor, Applied Mathematics  
and Computational Science and  
Engineering*

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## Citizenship

**United States.**

## Security Clearance

**Secret.**

## Education

- 1998-99 **Postdoctoral Fellow**, *Mathematics Department, University of Houston.*  
Under Marty Golubitsky: Group Theoretical Methods in Dynamical Systems
- 1996-98 **Postdoctoral Fellow**, *Physics Department, University of Houston.*  
Under Michael Gorman (deceased): Mathematical Physics, Spatio-Temporal Systems
- 1995 **PhD Applied Mathematics**, *Arizona State University.*  
Nonlinear Dynamics, Bifurcation Theory in Systems with Symmetry, Math Biology
- 1994 **MS Computer Science**, *Arizona State University.*  
Computer Graphics, Computer Aided Geometric Design
- 1990 **MS Applied Mathematics**, *Arizona State University.*  
Numerical Methods, Mathematical Modeling
- 1986 **BS Computer Engineering**, *La Salle University.*

## Employment

- 2008-Present **Professor**, *Department of Mathematics, San Diego State Univ.*
- 2004-2008 **Associate Professor**, *Department of Mathematics, San Diego State Univ.*
- 1999-2004 **Assistant Professor**, *Department of Mathematics, San Diego State Univ.*
- 1995-1996 **Research Scientist**, *Computer Graphics Laboratory, Hewlett-Packard Co.*

## Research Interests

Complex Nonlinear Systems, Equivariant Bifurcation Theory in Systems with Symmetry, ODEs and PDEs, Computational Methods, Mathematical Biology, Bioengineering, Stochastic Dynamics, Spatio-Temporal Pattern Forming Systems, Perturbation Methods, Engineering Applications of Nonlinear Dynamics (e.g., Networks of Magnetic and Electric Field Sensors, Networks of Vibratory Gyroscopes, Networks of Energy Harvesters, 1D and 2D networks of Superconducting Quantum Loops, Networks of Nano-oscillators, Antennas and Radars), Scientific Computing and Visualization.

## External Funding

- 2016-19 **ONR N00016-12013222, \$320,000**,  
*Complexity and Scaling Laws of Phase Drift in Symmetric Networks of Crystal Oscillators for Precision Timing*, PI A. Palacios.
- 2016-17 **ONR N00016-12-1-0464, \$25,000**,  
*4th International Conference on Theory and Applications of Nonlinear Dynamics*, PI A. Palacios.
- 2015-16 **DoD - SPAWAR Command N66001-15-D-0099, \$30,000**,  
*Synchronization of Nonlinear Oscillators and Nonlinear Signal reconstruction*, PI A. Palacios.
- 2012-15 **ARO W911NF-07-R-003-4, \$320,000**,  
*Exploiting Symmetry to Study Coherent Self-Sustaining Dynamics in High Dimensional Nonlinear Systems*, PI A. Palacios.
- 2012-13 **ARO 62136-EG-CF, \$25,000**,  
*3rd International Conference on Theory and Applications of Nonlinear Dynamics*, PI A. Palacios.
- 2012-13 **ONR N00014-12-1-0464, \$25,000**,  
*3rd International Conference on Theory and Applications of Nonlinear Dynamics*, PI A. Palacios.
- 2011-14 **NSF CMMI-1068831, \$250,731**,  
*DynSyst Special Topics: Spin Torque Nano-Oscillators for Microwave Signal Generation*, PI A. Palacios.
- 2011-12 **NSA Tactical SIGINT Technology Program N66001-08-D-0154, \$98,966**,  
*Arrays of Nonuniform Superconductive Loops*, PI A. Palacios.
- 2011-12 **ONR/STTR 5172-193-NV-1C Phase I, QUASAR-SDSU, \$80,000**,  
*Compact Broadband Geolocation Systems*, PI A. Palacios.
- 2009-12 **NSF CMMI-0923803, \$250,000**,  
*Coupled Inertial Navigation System*, PI A. Palacios.
- 2010-11 **NSA Tactical SIGINT Technology Program N66001-08-D-0154, \$99,154**,  
*Modeling and Simulation of Arrays of Superconductive Loops*, PI A. Palacios.
- 2010-11 **DoD - SPAWAR Command N66001-08-D-0154 DO 0007, \$64,962**,  
*Bifurcation Analysis of Coupled Gyroscopes*, PI A. Palacios.
- 2009-10 **NSF DMS-0923278, \$91,065**,  
*Acquisition of a Computational Mathematics Cluster*, PI J. Castillo, co-PI A. Palacios.
- 2009-10 **ONR N00014-10-1-0087, \$30,000**,  
*2nd International Conference on Applications in Nonlinear Dynamics September 2010, Lake Louise, CANADA*, PI A. Palacios.
- 2009-10 **NSA Tactical SIGINT Technology Program N66001-08-D-0154, \$93,683**,  
*Superconductive Quantum Interference Filters*, PI A. Palacios.
- 2008-09 **DoD - SPAWAR Command N66001-03-D-0042, \$49,889**,  
*Theoretical Analysis of Coupled Gyroscope Sensors*, PI A. Palacios.

- 2006-09 **NSF CMS-0638814, \$239,875,**  
*A Dynamical Systems Paradigm to Design and Operate Intelligent Magnetic Sensor Networks*, PI A. Palacios.
- 2007-08 **ONR N00014-07-1-0605, \$25,000,**  
*1st International Conference on Applications in Nonlinear Dynamics October 2007, Kauai, Hawaii*, PI A. Palacios.
- 2006-08 **NSF CMS-0625427, \$247,621,**  
*Intelligent Magnetic Sensor Networks for Surveillance and Detection of Improvised Explosive Devices*, PI A. Palacios.
- 2006-08 **NSF DMS-0504150, \$225,000,**  
*A Dynamical Systems Approach to Study Cellular Flame Instability*, PI A. Palacios.
- 2005-06 **DoD - SPAWAR Command N66001-06-M-1008 \$35,000,**  
*Advanced Dynamical Magnetic sensors for Defense Applications*, PI A. Palacios.
- 2003-05 **The San Diego Foundation C-2003-00307 \$60,000,**  
*Frequency switching in communications for homeland security*, PI A. Palacios.
- 2000-03 **DOE DE-PS26-00FT40759 \$323,279,**  
*Reduced order models of heat transfer in fluidized beds*, PI A. Palacios, co-PI Paul Cizmas, Texas A&M.
- 2000-05 **DoD - SPAWAR Command N66001-06-M-1007 \$77,000,**  
*Multi-frequency synthesis by symmetry-based methods*, PI A. Palacios.

### Pending External Funding

- 2016-19 **NSF CMMI-1068831, \$320,000,**  
*Bifurcations, Dynamics and Symmetry in Networks of Crystal Oscillators*, PI A. Palacios.
- 2016-19 **ONR NSSEFF Fellowship, \$3,000,000,**  
*Dynamics and Bifurcations in Complex Network Systems with Applications to Engineering Systems for Future DoD Capabilities*, PI A. Palacios.
- 2016-19 **ONR, MURI \$3,000,000,**  
*Synchronization of Complex Networks and Applications to Engineering Systems*, PI A. Palacios, In Preparation with UCLA and possibly UCSD.

### Internal Funding

- 2005-06 **SDSU Grant-in-aid \$2,100,**  
*Advanced Dynamic Magnetic Sensors*, PI A. Palacios.
- 2001-02 **SDSU Faculty Development Program \$2,000,**  
*Modulated Rotating Wave Patterns*, PI A. Palacios.
- 1999-00 **SDSU Research and Creative Activity Program \$4,000,**  
*Analysis and Visualization of Flame Patterns*, PI A. Palacios.
- 1999-00 **SDSU Grant-in-aid \$2,400,**  
*Analysis of Networks of Coupled Neurons*, PI A. Palacios.

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## Patents

- 2007 **U.S. Patent # 7196590**, *Multi-Frequency Synthesis Using Symmetry Methods in Arrays of Coupled Nonlinear Oscillators.*
- 2008 **U.S. Patent # 7420366**, *Coupled Nonlinear Sensor System.*
- 2009 **U.S. Patent # 7528606**, *Coupled Nonlinear Sensor System for Sensing a Time-Dependent Target Signal and Method of Assembling the System.*
- 2011 **U.S. Patent # 7898250**, *Coupled Fluxgate Magnetometers for DC and Time-Dependent (AC) Target Magnetic Field Detection.*
- 2011 **U.S. Patent # 8049486**, *Coupled Electric Field Sensors for DC Target Electric Field Detection.*
- 2012 **US Patent # 8049570**, *Coupled Bistable Microcircuit for Ultra-Sensitive Electric and Magnetic Field Sensing.*
- 2012 **US Patent # 8212569**, *Coupled Bistable Circuit for Ultra-Sensitive Field Sensing Utilizing Differential Transistor Pairs.*
- 2015 **US Patent # 8994461**, *Sensor Signal Processing Using Cascade Coupled Oscillators.*
- 2012 **Under Review by US Patent Office**, *Enhanced Performance in Coupled Gyroscopes and Elimination of Biasing Signal in a Drive-free Gyroscope, Navy Case 101427.*
- 2012 **Under Review by US Patent Office**, *Linear Voltage Response of Non-Uniform Arrays of Bi-SQUIDS, Navy Case 101302.*
- 2012 **Under Review by US Patent Office**, *Arrays of Superconducting Quantum Interference Devices with Self Adjusting Transfer to Convert Electromagnetic Radiation into a Proportionate Electrical Signal to Avoid Saturation, Navy Case 101950.*
- 2013 **Under Review by US Patent Office**, *2D Arrays of Diamond Shaped Cells Having Multiple Josephson Junctions, Navy Case 102297.*

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## Postdoc

- 2012-Present **Bernard Chan**,  
*Coupled Networks of Hamiltonian Systems*, Supported by ARO Grant.
- 2015-2016 **Jocirei Dias Ferreira**,  
*Feedforward Networks*, Supported by Research Grant from the Government of Brazil.

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## PhD Students / Computational Science and Engineering

- 2014 **Daniel Lyons**,  
*Dynamics and Bifurcations in Coupled Bistable Systems with Applications to Engineering Devices.*
- 2012 **Susan Berggren**,  
*Computational and Mathematical Modeling of Coupled Superconducting Quantum Interference Devices.*
- 2011 **Huy Vu**,  
*Coupled Vibratory Gyroscope with Bi-directional, Uni-directional and Direct Coupling.*

- 2009 **John Aven**,  
*Stochastic Dynamics in Coupled Bistable Systems with Applications to Sensor Devices.*
- 2008 **Bing Zhu**,  
*Computational Modeling and Bifurcation Analysis of Bubbling Fluidized Processes.*
- 2006 **Scott Gasner**,  
*Cellular Pattern Formation and Noise in  $O(2)$  Symmetric Systems.*
- 2005 **Patrick Longhini**,  
*Nonlinear Dynamics Design and Operation of Advanced Magnetic Sensors.*
- 2010-Present **James Turtle**,  
*Spin torque nano-oscillators for microwave signal generation.*

## MS Students / Applied Mathematics

- 2015 **Steven Reeves**,  
*Networks of Coupled Crystal Oscillators for Precision Timing.*
- 2014 **Tyler Levasseur**,  
*Feedforward Networks.*
- 2013 **Richard Shaffer**,  
*Stability Analysis of Coupled Spin Torque Nano-oscillators.*
- 2013 **Katie Beauvais**,  
*Series Arrays of Spin Torque Nano-oscillators.*
- 2012 **James Turtle**,  
*Numerical Exploration of the Dynamics of Coupled Spin-Torque Nano-Oscillators.*
- 2011 **Daniel Lyons**,  
*Effects of Delay on Coupled Sensor Systems.*
- 2011 **Nathan Davies**,  
*Collective Behavior of a Three-Vibratory Gyroscope System with Coupling Along the Drive and Sense Modes.*
- 2011 **Jeremy Banning**,  
*Dynamics of a Ring of Almost-Identical van der Pol Oscillators.*
- 2009 **Susan Guyler**,  
*Modeling and Simulation of the Dynamics of a Superconducting Quantum Interference Filter (SQIF) Device.*
- 2008 **Mayra Hernandez**,  
*Non-homogeneous Coupled Fluxgate Sensors.*
- 2006 **John Aven**,  
*Networks of Coupled Superconducting Quantum Interference Devices Magnetometers.*
- 2004 **Norbert Renz**,  
*Bifurcation Analysis of Multifrequency Patterns in Coupled van der Pol Oscillators.*
- 2004 **Scott Gasner**,  
*A Novel Algorithm for High-Dimensional Simulations of Cellular Flames.*
- 2003 **Kichol Lee**,  
*Reduced Order Models for Fluidized Beds.*
- 2002 **Patrick Longhini**,  
*Coupled Cell Systems.*

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## Undergraduate Special Thesis Projects

- 2011 **Katie Beauvais**,  
*Spintronics*,  
Physics.
- 2004 **Franz Rueckert**,  
*Bubble Behavior in Fluidization Systems*,  
Physics.
- 2002 **Habib Juarez**,  
*Cryptography with Cycling Chaos*,  
Applied Mathematics.
- 2001 **Andrew Bernardi**,  
*Fractal Interpolation for Simulations of Ocean Models*,  
Computational Science and Engineering.
- 2000 **Chris Eisele**,  
*Symmetry-breaking bifurcations in two-dimensional simulations of the Kuramoto-Sivashinsky equation*,  
Computational Science and Engineering.

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## Awards

- 2009-Present **Albert Johnson Distinguished Faculty**, *Nominated*.
- 2007 **Outstanding Faculty Award**, *Department of Mathematics*.
- 1986 **Indivisa Manent Award**, *La Salle University*, Engineering Department.
- 1986 **Graduated Summa Cum Laude**, *La Salle University*.

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## Publications

### Books

- [1] V. In and A. Palacios. *Symmetry in Complex Systems: A Unifying Approach to Developing Novel Sensor Devices*. In Preparation for Springer-Verlag, New York, 2016.

### Edited Books

- [2] V. In, P. Longhini, and A. Palacios. *Applications of Nonlinear Dynamics*. Springer-Verlag, San Diego, California, 2009.
- [3] V. In, P. Longhini, and A. Palacios. *2nd International Conference on Applications in Nonlinear Dynamics*. AIP Conference Proceedings, Lake Louis, CANADA, 2010.
- [4] V. In, P. Longhini, and A. Palacios. *International Conference on Theory and Applications in Nonlinear Dynamics*. Springer-Verlag, Seattle, Washington, 2013.

### Manuscripts

- [5] S. Baglio, B. Ando, S. Malfa, V. Marletta, C. Trigona, A. Bulsara, P. Longhini, A. Kho, V. In, J. Neff, G. Anderson, C. Obra, N. Liu, B. Meadows, and A. Palacios. Exploiting nonlinear dynamics in novel measurement strategies and devices: From theoretical models to experiments and applications. *IEEE Transactions on Instrumentation and Measurement*, 60(3):667–695, 2011.

- [6] K. Beauvais, A. Palacios, R. Shaffer, J. Turtle, V. In, and P. Longhini. Coupled spin-torque nano oscillators: Stability of synchronization. In M.G. Cojocar, I.S. Kotsireas, R.N. Makarov, R. Melnik, and H. Shodiev, editors, *Advances in Mathematical and Computational Methods: Addressing Modern Challenges of Science, Technology and Society*, volume 117, pages 43–48. Springer Proceedings in Math & Statistics, 2015.
- [7] V. Berardi, R. Carretero-Gonzalez, M.F. Hovell, N.E. Kepleis, A. Palacios, J. Belletiere, and S. Hughes. Proper orthogonal decomposition methods for air particle time-series in residences: Exploring peak clustering by occupant behavior patterns. *Journal of Computational Science*, 11:102–111, 2015.
- [8] S. Berggren, P. Longhini, A. Palacios A.L. de Escobar, O. Mukhanov, and G. Prokopenko. Modeling the effects of fabrication spreads and noise on series coupled arrays of bi-squids. In *Superconductive Electronics Conference (ISEC)*, pages 1–3, 2013.
- [9] S. Berggren and A. Palacios. Analytical approximation to the dynamics of an array of coupled dc squids. *The European Physical Journal B*, 87:83, April 2014.
- [10] S. Berggren, G. Prokopenko, P. Longhini, A. Palacios, O. Mukhanov, A.L. de Escobar, B. Taylor, M.C. de Andrade, M. Nisenoff, and R.L. Fagaly. Development of 2d bi-squid arrays with high linearity. *IEEE Transactions on Applied Superconductivity*, 23(3):1400208–1400208, 2013.
- [11] P. Blomgren, S. Gasner, and A. Palacios. Hopping behavior in the kuramoto-sivashinsky equation. *Chaos*, 15:013706, 2005.
- [12] P. Blomgren, S. Gasner, and A. Palacios. Stable second-order scheme for integrating the kuramoto-sivashinsky equation in polar coordinates. *Physical Review E*, 72(3):036701, 2005.
- [13] P. Blomgren, S. Gasner, and A. Palacios. Noise-induced intermittent cellular patterns on circular domains. *International Journal of Bifurcation and Chaos*, 17(8):1–15, 2007.
- [14] P. Blomgren, J.M. Martinez, and A. Palacios. Intermittency near a co-dimension three steady-state bifurcation. *International Journal of Bifurcation and Chaos*, 21(1):287–304, 2011.
- [15] P. Blomgren, A. Palacios, and S. Gasner. Recent advances in 2+1 dimensional simulations of the pattern-forming kuramoto-sivashinsky equation. *Mathematics and Computers in Simulations*, 79(6):1810–1823, 2009.
- [16] P. Blomgren, A. Palacios, B. Zhu, S. Daw, C. Finney, J. Halow, and S. Pannala. Bifurcation analysis of bubble dynamics in fluidized beds. *Chaos*, 17:013120, 2007.
- [17] A. Bulsara, V. In, A. Kho, G. Anderson, C. Obra, P. Longhini, J. Neff, S. Baglio, B. Ando, and A. Palacios. Time domain quantification of the performance of a nonlinear dynamic device in the presence of a noise floor. *Eur. Phys. J. B*, 69:109–118, 2009.
- [18] A. Bulsara, V. In, A. Kho, P. Longhini, A. Palacios, W. Rappel, J. Acebron, S. Baglio, and B. Ando. Emergent oscillations in unidirectionally coupled overdamped bistable systems. *Physical Review E*, 70:036103, 2004.
- [19] A. Bulsara, V. In, A. Kho, A. Palacios, P. Longhini, S. Baglio, and B. Ando. Exploiting nonlinear dynamics in a coupled core fluxgate magnetometer. *Measurement Science and Technology*, 19:075203, 2008.
- [20] A. Bulsara, J. Lindner, V. In, A. Kho, S. Baglio, V. sacco, B. Ando, P. Longhini, A. Palacios, and W. Rappel. Coupling-induced cooperative behavior in dynamic ferromagnetic cores in the presence of a noise floor. *Physics Letters A*, 353:4–10, 2006.
- [21] P.-L. Buono, M. Golubitsky, and A. Palacios. Heteroclinic cycles in mode interactions with dn symmetry. In Z. Chen, S.-N. Chow, and K. Li, editors, *Bifurcation Theory and Its Numerical Analysis: 2nd International Conference, Xi'an*, pages 13–27, 1998.
- [22] P.-L. Buono, M. Golubitsky, and A. Palacios. Heteroclinic cycles in rings of coupled cells. *Physica D*, 143:74–108, 2000.

- [23] P.L. Buono, B. Chan, J. Ferreira, A. Palacios, S. Reeves, P. Longhini, and V. In. Collective patterns of oscillations in networks of crystal oscillators for precision timing. *SIAM Journal of Applied Dynamical Systems*, Submitted, 2015.
- [24] P.L. Buono, B. Chan, A. Palacios, and V. In. Dynamics and bifurcations in a dn-symmetric hamiltonian network. application to coupled gyroscopes. *Physica D*, 290:8–23, 2015.
- [25] P.L. Buono, B. Chan, A. Palacios, and V. In. A hamiltonian approach to model and analyse networks of nonlinear oscillators: Applications to gyroscopes and energy harvesters. *Pramana Journal of Physics*, 85(5):929–945, 2015.
- [26] P.L. Buono, C. Dabrowski, A. Palacios, and J. Turtle. Collective behavior of an array of spin-torque nano oscillators. In *Nanotech 2014: MEMS, Fluidics, BioSystems, Medical, Computational & Photonics*, volume 2, pages 391–394, 2014.
- [27] P.L. Buono and A. Palacios. Heart motoneuron dynamics of leeches. In *7th Experimental Chaos Conference*, volume 676, pages 257–262, 2003.
- [28] P.L. Buono and A. Palacios. A mathematical model of motoneuron dynamics in the heartbeat of the leech. *Physica D*, 188:292–313, 2004.
- [29] B. Chan, P.L. Buono, and A. Palacios. Topology and bifurcations in hamiltonian coupled cell systems. *Dynamical Systems: An international journal*, Submitted, 2015.
- [30] P. Cizmas and A. Palacios. Proper orthogonal decomposition of turbine rotor-stator interaction. *Journal of Propulsion and Power*, 19(2):268–281, 2003.
- [31] P. Cizmas, A. Palacios, T. O'Brien, and M. Syamlal. Proper orthogonal decomposition of spatial-temporal patterns in fluidized beds. *Chem. Engineering Science*, 58:4417–4427, 2003.
- [32] N. Davies, H. Vu, A. Palacios, V. In, and P. Longhini. Collective behavior of a coupled gyroscope system with coupling along the drive and sense modes. *International Journal of Bifurcation and Chaos, To Appear*, 23(1):1350006, 2013.
- [33] L. Demasi and A. Palacios. A reduced-order nonlinear aeroelastic analysis of joined wings based on the proper orthogonal decomposition. In *51st AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, pages 1–26, 2010.
- [34] M. Hernandez, V. In, P. Longhini, A. Palacios, A. Bulsara, and A. Kho. Coupling-induced oscillations in nonhomogeneous, overdamped, bistable systems. *Physics Letters A*, 372(24):4381–4387, 2008.
- [35] V. In, A. Bulsara, A. Kho, A. Palacios, S. Baglio, B. Ando, and V. Sacco. Exploiting dynamic cooperative behavior in a coupled-core fluxgate magnetometer. In Salvatore Baglio and Adi Bulsara, editors, *Device Applications of Nonlinear Dynamics*, pages 67–82, Catania, Italy, 2006.
- [36] V. In, A. Bulsara, A. Kho, A. Palacios, S. Baglio, B. Ando, and V. Sacco. Reconfigurable pattern generators using nonlinear electronic circuits. In Salvatore Baglio and Adi Bulsara, editors, *Device Applications of Nonlinear Dynamics*, pages 245–252, Catania, Italy, 2006.
- [37] V. In, A. Bulsara, A. Kho, A. Palacios, P. Longhini, J. Acebron, S. Baglio, and B. Ando. Self-induced oscillations in electronically coupled fluxgate magnetometers. In *8th Experimental chaos conference*, pages 57–62, Florence, Italy, 2004.
- [38] V. In, A. Bulsara, A. Palacios, S. Baglio, B. Ando, P. Longhini, J. Neff, B. Meadows, and A. Bulsara. Self-induced oscillations in coupled fluxgate magnetometers: a novel approach to operating the magnetic sensors. In *2004 International Symposium on Circuit and Systems*, volume 4, pages 736–739, 2004.
- [39] V. In, A. Bulsara, A. Palacios, P. Longhini, and A. Kho. Complex dynamics in unidirectionally coupled overdamped bistable systems subject to a time-periodic external signal. *Physical Review E Rapid Communications*, 72(4):045104, 2005.
- [40] V. In, A. Bulsara, A. Palacios, P. Longhini, A. Kho, and J. Neff. Coupling induced oscillations in overdamped bistable systems. *Physical Review E Rapid Communications*, 68:045102–1–045102–4, 2003.



- [41] V. In, A. Kho, A. Bulsara, J. Neff, S. Baglio, V. Sacco, A. Palacios, and P. Longhini. Coupling nonlinear sensors for enhanced sensitivity: A prototype using the three coupled-core fluxgate magnetometer. In *Proceedings of the 4th IEEE Conference on Sensors*, pages 57–60, Irvine, California, 2006.
- [42] V. In, A. Kho, P. Longhini, and A. Palacios. Coupled overdamped bistable systems with applications to sensor devices. *Focus Issue of Nonlinear Theory and its Applications, IEICE*, 3(4):477–496, 2012.
- [43] V. In, A. Kho, J. Neff, A. Palacios, P. Longhini, and B. Meadows. Experimental observation of multifrequency patterns in arrays of coupled nonlinear oscillators. *Physical Review Letters*, 91(24):244101–1–244101–4, 2003.
- [44] V. In, P. Longhini, A. Kho, N. Liu, S. Naik, A. Palacios, and J. Neff. Frequency down-conversion using cascading arrays of coupled nonlinear oscillators. *Physica D*, 240:701–708, 2011.
- [45] V. In, P. Longhini, A. Kho, J.D. Neff, D. Leung, N. Liu, B.K. Meadows, F. Gordon, and A. Palacios. Nonlinear channelizer. *Chaos, Special Focus Issue: "Fifty Years of Chaos: Applied and Theoretical"*, 22:047514, 2012.
- [46] V. In, P. Longhini, N. Liu, A. Kho, J. Neff, A. Palacios, and A. Bulsara. A bistable microelectronic circuit for sensing extremely low electric field. *Journal of Applied Physics*, 107:014506, 2010.
- [47] V. In, A. Palacios, A. Bulsara, P. Longhini, A. Kho, Joseph Neff, Salvatore Baglio, and Bruno Ando. Complex behavior in driven unidirectionally coupled overdamped duffing elements. *Physical Review E*, 73(6):066121, 2006.
- [48] V. In, V. Sacco, A. Kho, S. Baglio, B. Ando, A. Bulsara, and A. Palacios. Exploiting nonlinear dynamics in a coupled core fluxgate magnetometer. *Measurement Science and Technology*, 19:075203, (2008).
- [49] V. In J. Turtle, A. Palacios and P. Longhini. The dynamics of coupled spin-torque nano oscillators. an initial exploration. In *International Conference on Theory and Application in Nonlinear Dynamics*, pages 285–291. Springer, 2013.
- [50] J.D. Kelley, G.H. Gunaratne, A. Palacios, and J. Shulman. Modal decomposition and normal form for hydrodynamic flows: Examples from cellular flame patterns. *The European Physical Journal Special Topics*, 204:119–131, 2012.
- [51] P. Longhini, S. Berggren, A.L. de Escobar, A. Palacios, S. Rice, B. Taylor, V. In, O. Mukhanov, G. Prokopenko, M. Nisenoff, E. Wong, and M.C. de Andrade. Voltage response of nonuniform arrays of bi-superconductive quantum interference devices. *Journal of Applied Physics*, 111:093920, 2012.
- [52] P. Longhini, S. Berggren, A. Palacios, and A.L. de Escobar. Coupled non-uniform bi-squid: A numerical investigation. In *AIP Conference Proceedings, Advances on Cryogenic Engineering: Transactions of the Cryogenic Conference (CEC/ICMC)*, volume 1434, pages 1167–1174, 2012.
- [53] P. Longhini, S. Berggren, A. Palacios, A.L. de Escobar, and V. In. Coupled serial and parallel non-uniform squids. In *International Conference on Applications in Nonlinear Dynamics*, volume 1339, pages 254–259, Lake Louis, CANADA, 2011.
- [54] P. Longhini, S. Berggren, A. Palacios, V. In, and A.L. de Escobar. Modeling non-locally coupled dc squid arrays. *IEEE Transactions on Applied Superconductivity*, 21(3):391–393, 2011.
- [55] P. Longhini, A. Palacios, V. In, J. Neff, A. Kho, and A. Bulsara. Exploiting dynamical symmetry in coupled nonlinear elements for efficient frequency down-conversion. *Physical Review E*, 76:026201, 2007.
- [56] D. Lyons, J. Mahaffy, A. Palacios, V. In, P. Longhini, and A. Kho. Basins of attraction in a ring of overdamped bistable systems with delayed coupling. *Physics Letters A*, 374:2709–2722, 2010.

- [57] D. Lyons, J. Mahaffy, S. Wang, A. Palacios, and V. In. Geometry of basins of attraction and heteroclinic connections in coupled bistable systems. *International Journal of Bifurcation and Chaos*, 24(10):1430029, 2014.
- [58] A. Matus-Vargas, A. Palacios, H. Gonzalez, V. In, S. Naik, and A. Phipps. Dynamics, bifurcations and normal forms in arrays of magnetostrictive energy harvesters with all-to-all coupling. *International Journal of Bifurcation and Chaos*, 25(2):1550026, 2015.
- [59] S. Naik, T. Hikihara, A. Palacios, V. In, H. Vu, and P. Longhini. Characterization of synchronization in a unidirectionally coupled system of nonlinear micromechanical resonators. *Sensors and Actuators A*, 171(2):361–369, 2011.
- [60] S. Naik, T. Hikihara, H. Vu, A. Palacios, V. In, and P. Longhini. Local bifurcations of synchronization in self-excited and forced unidirectionally coupled micromechanical resonators. *Journal of Sound and Vibration*, 331(5):1127–1142, 2011.
- [61] S. Naik, A. Phipps, V. In, Peyton Cavaroc, A. Matus-Vargas, A. Palacios, and H. Gonzalez. Energy harvesting with coupled magnetostrictive resonators. In Wei-Hsin Liao, editor, *SPIE Proceedings. Active and Passive Smart Structures and Integrated Systems 2014*, volume 9057, March 2014.
- [62] J. Neff, V. In, C. Obara, and A. Palacios. Applications of nonlinear and reconfigurable electronic circuits. In *Applications of Nonlinear Dynamics*, pages 119–132, San Diego, California, 2009. Springer-Verlag.
- [63] A. Palacios. Symmetry-breaking bifurcations in simulations of the kuramoto-sivashinky equation. In *First Compaq-Sponsored Conference on Computational Science*, 2000.
- [64] A. Palacios. Cycling chaos in one-dimensional coupled iterated maps. *International Journal of Bifurcation and Chaos*, 12(8):1859–1868, 2002.
- [65] A. Palacios. Heteroclinic cycles in coupled systems of difference equations. *Int. J. Diff. Eq. Appl.*, 9(7):671–686, (2002).
- [66] A. Palacios. Identification of modulated rotating waves in pattern-forming systems with  $o(2)$  symmetry. *Discrete and Continuous Dynamical Systems*, B 2(1):129–147, 2002.
- [67] A. Palacios. Heteroclinic cycles. *Scholarpedia*, page 8163, 2007.
- [68] A. Palacios, D. Armbruster, E. Kostelich, and E. Stone. Analyzing the dynamics of cellular flames. *Physica D*, 60:132–161, 1996.
- [69] A. Palacios, J. Aven, V. In, P. Longhini, A. Kho, J. Neff, and A. Bulsara. Coupled-core fluxgate magnetometer: Novel configuration scheme and the effects of a noise-contaminated external signal. *Physics Letters A*, 367:25–34, 2007.
- [70] A. Palacios, J. Aven, P. Longhini, V. In, and A. Bulsara. Cooperative dynamics in coupled noisy dynamical systems near a critical point; the dc squid as a case study. *Physical Review E*, 74:021122, 2006.
- [71] A. Palacios, P. Blomgren, and S. Gasner. Bifurcation analysis of hopping behavior in cellular pattern-forming systems. *International Journal of Bifurcation and Chaos*, 17(2):509–520, 2007.
- [72] A. Palacios, R. Carretero-Gonzalez, P. Longhini, N. Renz, V. In, A. Kho, J. Neff, B. Meadows, and A. Bulsara. Multifrequency synthesis using two coupled nonlinear oscillator arrays. *Physical Review E*, 72:026211, 2005.
- [73] A. Palacios, C. Finney, P. Cizmas, S. Daw, and T. O'Brien. Experimental analysis and visualization of spatio-temporal bubble patterns in fluidized beds. *Chaos*, 14(2):499–509, 2004.
- [74] A. Palacios, M. Gorman, and K. Robbins. Visualization, animation and kl decomposition of spatiotemporal dynamics in a pattern-forming system. In *4th Experimental Chaos Conference*, pages 31–36, 1997.
- [75] A. Palacios, L. Gross, and A. Rockwood. Dynamics and chaos: the spherical pendulum. *Computer Graphics Forum*, 15(4):263–270, 1996.

- [76] A. Palacios, G. Gunaratne, and M. Gorman. Modal decomposition of hopping motion in cellular flame patterns. *Chaos*, 9:755–767, 1999.
- [77] A. Palacios, G. Gunaratne, M. Gorman, and K. Robbins. Cellular pattern formation in circular domains. *Chaos*, 7(3):463–475, 1997.
- [78] A. Palacios, G. Gunaratne, M. Gorman, and K. Robbins. A karhunen-loève analysis of spatiotemporal flame patterns. *Physical Review E*, 57(5):5958–5971, 1998.
- [79] A. Palacios, V. In, P. Longhini, and A. Kho. Symmetry induced heteroclinic cycles in coupled sensor devices. In T. Hikihara, editor, *IUTAM Symposium on 50 Years of Chaos : Applied and Theoretical*, volume 5, pages 144–150, Tokyo, Japan, 2012. Elsevier.
- [80] A. Palacios and H. Juarez. Cryptography with cycling chaos. *Physics Letters A*, 303:345–351, 2002.
- [81] A. Palacios and P. Longhini. Cycling behavior in near-identical cell systems. *International Journal of Bifurcation and Chaos*, 13(9):2719–2732, 2003.
- [82] A. Palacios, H. Vu, V. In, and P. Longhini. Symmetry-based design and fabrication of novel sensor systems. In I. Kotsireas, R. Melnik, and B. West, editors, *Advances in Mathematical and Computational Methods: Addressing Modern Challenges of Science, Technology and Society*, volume 1368, pages 97–100, Melville, New York, 2011. American Institute of Physics.
- [83] G. Prokopenko, O. Mukhanov, A.L. de Escobar, B. Taylor, M.C. de Andrade, S. Berggren, P. Longhini, A. Palacios, and M. Nisenoff. Dc and rf measurements of wideband serial bi-squid arrays. *IEEE Transactions on Applied Superconductivity*, 23:1400607, 2013.
- [84] J. Turtle, K. Beauvais, R. Shaffer, A. Palacios, T. Emery, V. In, and P. Longhini. Gluing bifurcations in coupled spin torque nano-oscillators. *Journal of Applied Physics*, 113(11):114901–114901–10, 2013.
- [85] H. Vu, A. Palacios, V. In, P. Longhini, and J. Neff. Two-time scale analysis of a ring of coupled vibratory gyroscopes. *Physical Rev. E.*, 81:031108, 2010.
- [86] H. Vu, A. Palacios, V. In, P. Longhini, and J. Neff. A drive-free vibratory gyroscope. *Chaos*, 21:013103, 2011.
- [87] H. Vu, A. Palacios, V. In, P. Longhini, and J. Neff. An overview of a perturbation analysis for unidirectionally coupled vibratory gyroscopes. In V. In, P. Longhini, and A. Palacios, editors, *Proceedings of the 2nd International Conference on Applications in Nonlinear Dynamics*, volume 1339, page 309. AIP, 2011.
- [88] D. Zhang, G. Wei, D. Kouri, D. Hoffmann, M. Gorman, G. Gunaratne, and A. Palacios. Integrating the kuramoto-sivashinsky equation in a circular domain. *Physical Review E*, 60(3):3353–3360, 1999.

## Presentations

- 2015 **2015 International Symposium on Nonlinear Theory and its Applications (NOLTA2015), Hong Kong, CHINA,**  
*Complex Networks of Coupled Gyroscopes.*
- 2015 **Instituto Tecnológico de Estudios Superiores de Monterrey, Campus Puebla, MEXICO,**  
*Complex Networks of Crystal Oscillators for Precision Timing.*
- 2015 **MBI Workshop on Applied Dynamical Systems, Ohio State University,**  
*Complex Networks. Connecting Equivariant Bifurcation Theory with Engineering Applications.*
- 2014 **Bharathidasan University, Trichy, India,**  
*Symmetry in Complex Systems: Linking Applied Mathematics with Engineering Applications.*

- 2013 **Instituto Tecnológico de Estudios Superiores de Monterrey, Campus Puebla, MEXICO,**  
*Energy Harvesting Systems.*
- 2013 **Laurier Centennial Conference on Applied Mathematics, Modeling and Computational Science, Waterloo, CANADA,**  
*Collective Behavior of a Network of Spin Torque Nano-Oscillators.*
- 2013 **SIAM Annual Meeting, USA,**  
*Attributing Tropospheric Ozone Formation to Precursor Spurces.*
- 2012 **Instituto Tecnológico de Estudios Superiores de Monterrey, Campus Puebla, MEXICO,**  
*Coupled Nonlinear Oscillators: Linking Dynamical Systems Theory with Engineering Applications.*
- 2012 **State University of New York, Buffalo, USA,**  
*Coupled Nonlinear Oscillators: Linking Dynamical Systems Theory with Engineering Applications.*
- 2012 **University of Toronto, Toronto, CANADA,**  
*Coupled Nonlinear Oscillators: Linking Dynamical Systems Theory with Engineering Applications.*
- 2012 **University of California, Santa Barbara, USA,**  
*Coupled Nonlinear Oscillators: Linking Dynamical Systems Theory with Engineering Applications.*
- 2012 **Harvard University, Cambridge, MA, USA,**  
*Linking Applied Mathematics with Social Science Research.*
- 2012 **9th AIMS International Conference on Dynamical Systems, Orlando, FL, USA,**  
*Bifurcation and Asymptotic Analysis of a Coupled Gyroscope Systems.*
- 2012 **CCS2012 Chaos Symposium on Chaos and Complexity, Antalya, TURKEY,**  
*Synchronization and Chaos in Coupled Gyroscope Systems.*
- 2011 **IUTAM Symposium on 50 Years of Chaos, Kyoto JAPAN,**  
*Heteroclinic Cycles in Coupled Systems with Applications to Sensor Devices.*
- 2011 **Superconductivity Centennial Conference, The Hague, THE NETHERLANDS,**  
*Nonuniform Arrays of Superconductive Loops.*
- 2011 **Laurier Centennial Conference on Applied Mathematics, Modeling and Computational Science, Waterloo, CANADA,**  
*Symmetry-based Design of Novel Sensor Systems.*
- 2010 **2nd International Conference on Applications in Nonlinear Dynamics, Lake Louis, CANADA,** *Nonuniform Arrays of Superconducting Quantum Loops.*
- 2009 **Applied Math Seminar, University of Ontario Institute of Technology, Ontario, CANADA,** *Symmetry in Complex Systems.*
- 2009 **International Symposium on Nonlinear Theory and its Applications, Sapporo, JAPAN,** *Bistable Micro-Circuit for the Combined Electric Field and Magnetic Field Sensor.*
- 2008 **SIAM Annual Meeting, San Diego, CA, USA,**  
*A Dynamical Systems Approach to Design and Operate Dynamic Sensors.*

- 2007 **International Congress on Industrial And Applied Mathematics, Zurich, SWITZERLAND,**  
*Coupled Cell Systems: A Paradigm for Designing Advanced Magnetic Sensors.*
- 2007 **SIAM Conference on Applications of Dynamical Systems, Utah, USA,**  
*Coupled Cell Systems: A Paradigm for Designing Advanced Magnetic Sensors.*
- 2007 **1st International Conference on Applications in Nonlinear Dynamics, Hawaii, USA,**  
*Applications of Nonlinear and Reconfigurable Electronic Circuits.*
- 2006 **VI PanAmerican Workshop on Applied and Computational Mathematics, Oaxaca, MEXICO,**  
*Recent Advances in 2 Dimensional Simulations of the Pattern-Forming Kuramoto-Sivashinsky Equation.*
- 2005 **SIAM Annual Meeting, San Diego, CA, USA,**  
*Pattern Formation and Hopping Behavior in the Kuramoto-Sivashinsky Equation.*
- 2004 **8th Experimental Chaos Conference, Florence, ITALY,**  
*Self-induced Oscillations in Electronically Coupled Fluxgate Magnetometers.*
- 2003 **7th Experimental Chaos Conference, San Diego, CA, USA,**  
*Motorneuron dynamics in the heartbeat of leeches.*
- 2003 **SIAM Conference on Computational Science and Engineering, San Diego, California, USA,**  
*Description of fluidized beds using proper orthogonal decomposition.*
- 2002 **SIAM Conference on Numerical Combustion, Sorrento, ITALY,**  
*Modulated Rotating Wave Patterns in Combustion Experiments with Circular Symmetry.*
- 2001 **PIMS-MITACS Workshop on Computational Fuel Cell Dynamics, Vancouver, CANADA,**  
*Symmetry-breaking bifurcations in cellular flame patterns.*
- 2001 **Applied Mathematics Workshop, University of California at Irvine, USA,**  
*Heteroclinic cycles in coupled cell systems.*
- 2000 **SIAM Conference on Numerical Combustion, Amelia Island, Florida, USA,**  
*Analysis and visualization of symmetry-breaking bifurcations in cellular flame patterns.*
- 1999 **SIAM Conference on Applications of Dynamical Systems, Utah, USA,**  
*Modal decomposition of hopping motion in cellular flame patterns.*

## Professional and Academic Activities

**2012 Cluster Chair for Committee of Visitors (COV) to review NSF / Division of Civil, Mechanical and Manufacturing Innovation (CMMI).**

**Proposal Review for NSF, CAREER NSF, NIH, DOE, CRDF.**

**Associate Editor,** *International Journal of Modern Nonlinear Theory and Application.*

**Invited Guest Editor,** *Symmetry. An Open Access Journal.*

**Chair of Applied Mathematics Hiring Committee,** *San Diego State University.*

**Reappointment, Tenure, and Promotion Committee,** *San Diego State University.*

**Graduate Advisor, Program in Dynamical Systems,** *San Diego State University.*

**Executive Committee, Computational Science and Engineering Program,**  
*San Diego State University.*

**Graduate Development Committee,**  
*Mathematics Department, San Diego State University.*

**Co-organizer of 3rd International Conference on Applications in Nonlinear Dynamics, Seattle, WA, 2012.**

**Co-organizer of 2nd International Conference on Applications in Nonlinear Dynamics, Lake Louis, CANADA, 2011.**

**Co-organizer of 1st International Conference on Applications in Nonlinear Dynamics, Kauai, Hawaii, 2007.**

**Referee, *Bulletin of Mathematical Biology, Biophysics, Chaos, Combustion Theory and Modeling, Communications in Mathematical Sciences, Discrete and Continuous Dynamical Systems, Series B, IEEE Transactions on Sensors, Journal of Differential Equations, Journal of Physics A, Mathematics and Computers in Simulation, Nonlinearity, Nonlinear Analysis Series B, Physica D, Physical Review E, Physics Letters A, Scholarpedia, SIAM Journal on Applied Dynamical Systems, Studies in Nonlinear Dynamics and Econometrics.***