

Javier Angel Kypuros

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Education:

Ph.D. Mechanical Engineering, University of Texas at Austin (UT Austin), 2001
M.S. Mechanical Engineering, University of Texas at Austin, 1998
B.S. Mechanical Engineering, Princeton University, 1996

Teaching:

9/2008-Present *Associate Professor*, University of Texas-Pan American (UTPA), Mechanical Engineering Teach courses in the areas of dynamic system modeling and control.
9/2002-8/2008 *Assistant Professor*, University of Texas-Pan American (UTPA), Mechanical Engineering Taught courses in the areas of dynamic system modeling and control.
1/2001-8/2002 *Assistant Professor*, University of Texas at El Paso (UTEP), Mechanical Engineering Taught courses in the areas of dynamic systems and controls.

Grants and Contracts:

2009-Present *Wireless Health Monitoring of Railroad Tapered-Roller Bearings*
The project seeks to develop algorithms for monitoring railroad bearing and predicting failure based on temperature and vibration signals. Amsted Rail Group supports the research.

2009-Present *Multimodal Modules for Inquiry-Based Statics and Dynamics Curriculum*
The project seeks to design, implement, and assess inquiry-based modules developed to improve student concept mastery, knowledge transfer, and knowledge retention. The modules use a guided form of discover learning and incorporate aspects of challenge-based activities. Research is supported by an NSF CCLI grant.

2008-Present *Breaking free of the Laboratory, UTSA and UTPA*
This project seeks to design, implement, and assess PDA-enabled data acquisition modules to incorporate laboratory experiences into courses with that traditional do not include a laboratory. Research is supported by an NSF CCLI grant.

2008-Present *Brenco Bearing Field Test, UTPA*
Train cars will be instrumented to measure temperature trends and vibrations within axle bearings to predict modes of failure and identify potential markers. Research sponsored by Brenco, Inc.

2004-2008 *Adaptive Control of Morphing Structures and Biomimetic Control Surfaces, UTPA*
Smart material and structure concepts are being used to formulate system definitions for modeling and control of biomimetic morphing control surfaces proposed for aeronautic and submersible vehicles. Research was supported by the Texas Space Grant Consortium through grant number UTA04-531.

2003-2006 *Remotely-Accessible and Virtual Laboratory Curriculum, UTPA*
Research aims to develop remotely-accessible systems and virtual systems designed to demonstrate to students dynamic systems and controls concepts. Project involves development of a Dynamic Systems and Controls Concept Inventory assessment tool that will be Web-administered and will measure the impact of the systems on improving student conceptualization of fundamentals. Project supported by NSF through grant number DUE-0311349.

2002-2005 *Optimal Active Constrained Layer Damping of Vibrating Structures, UTPA*
Project aims to develop methods to minimize peak displacements of vibrating structures via a geometrically optimized damping layer and strategically placed piezoelectric actuators (within a constraining layer) that are controlled using a distributed optimal control method. Research was supported by NASA through grant number NAG8-1634.

2002-2003 *Active Control of Turbine Tip Clearance, NASA Glenn Research Center*
Project aims to develop baseline models and simulations of smart-material turbine blade actuation and control to determine feasibility of such an application. Research supported by NASA through grant number NAG3-2857.

- 2002 *Development of Control Strategies for Microthruster Propellant Flow, UTEP*
 Research involves developing methods for control of microthruster arrays for space exploration and micro-aerial vehicles for military reconnaissance. NASA funded research through grant number NAG3-2773 for a Faculty Award for Research (FAR).
- 1999-2002 *Variable Fidelity Modeling of Complex Vehicle Systems, UT Austin & UTEP*
 Research developed methods to synthesize models of desirable fidelity for complex vehicle systems to improve numerical efficiency and/or physical insight. Research supported by NSF through grant number EEC-9706083 for the Industry/University Cooperative Research Center (I/UCRC) for the Virtual Proving Ground for Mechanical and Electromechanical Systems at UT Austin.
- 1996-2001 *Physical Switching in Dynamical Systems, UT Austin*
 Research involved the development of methods to efficiently model dynamic systems that employ physical switches. Research supported by grant from the Dynamics Systems and Controls Division at the NSF through grant number CMS-9634901.
- 1999-2000 *Virtual Prototyping of Military Vehicle and Missile Deployment System, UT Austin*
 Models were synthesized to conduct virtual vehicle mission studies for analysis and design. System models simulated using DADS and MATLAB/Simulink. Work supported by the US Army via the NSF I/UCRC at UT Austin through grant number EEC-9706083.

External Service:

- 2011 Chair of NSF TUES I Review Panel
- 2010 Member of Editorial Board for the *Journal of Applications and Practices in Engineering Education*
- 2010 Reviewer for the IEEE Transactions on Education
- 2009-Present Member of the Advisory Board for Edco Ventures (a venture development non-profit)
- 2009 Reviewer for the *ASME Journal of Dynamic Systems, Measurements, and Control*
- 2006 Reviewer for the *International Journal of Vehicle Systems Modeling and Testing*
- 2006 Reviewer for *Proceedings of the ASME IMECE Design, Accreditation, and Retention Symposium*
- 2002-2006 Reviewer for *Proceedings of the ASME IMECE Automated Modeling Symposium*
- 2004 NSF CCLI Review Panelist
- 2003 NSF MRI Review Panelist

Consulting:

- 1997 *Consultant to Applied Materials Inc.*
 Project involved development of a model and computer simulation of a complex, semiconductor-manufacturing device; model used as an aid to improve design and control of the system.

Industry Experience:

- Summer 1996 *Rohr High Temperature Aerostructures Inc., Engineer in Training*
 Responsibilities involved heat transfer analysis of an industrial vacuum furnace. Analysis conducted of main support structure at the floor of the furnace used to support mandrels for manufacturing jet propulsion exhaust nozzles. Analysis used in suggesting and designing alternative support structure to minimize bending and thermal stresses.
- Summer 1995 *City Public Service of San Antonio, Engineer in Training*
 Major responsibilities involved developing a graphical database of all the pressure regulators, valves, etc. in the San Antonio gas utility system.

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Publications:

- ❖ Tarawneh, C., Fuentes, A.A., Kypuros, J.A., Navarro, L.A., and Vaipan, A.G., "Thermal Finite Element Modeling of a Railroad Tapered Roller Bearing," submitted for review to the *ASME Journal of Thermal Science and Engineering Applications*.
- ❖ Kypuros, J.A., Tarawneh, C., Vasquez, H., Knecht, M., and Wrinkle, R., 2011, "Guided Discovery Modules for Engineering Mechanics," to appear in *Journal of Applications and Practices in Engineering Education*, 2(1).
- ❖ Kypuros, J.A., Tarawneh, C., Zagouris, Z., Woods, S., Wilson, B.M., and Martin, A., 2011, "Implementation of Wireless Temperature Sensors for Continuous Condition Monitoring of Railroad Bearing," to appear in the *Proceedings of the ASME RTD Fall Technical Conference*.
- ❖ Kypuros, J.A., Vasquez, H., Tarawneh, C., Knecht, M., and Wrinkle, R., 2011, "Guided Discovery Modules for Statics and Dynamics," *Proceedings of the ASEE Conference and Exposition*.
- ❖ Tarawneh, C. M., Kypuros, J. A., Fuentes, A. A., Wilson, B. M., Gonzalez, B. A., and Rodriguez, G., 2009 "Vibration Signatures of Temperature Trended Bearings in Field and Laboratory Testing," *Proceedings of the ASME RTC Fall Technical Conference*.
- ❖ Kypuros, J. A., Connolly, T. J., and Schmidt, K. J., 2009, "Breaking Free from the Laboratory Using PDAs," accepted for publication in the *Proceedings of the Frontiers in Education Conference*.
- ❖ Connolly, T. J., Kypuros, J. A., and Schmidt, K. J., 2009, "Breaking Away from the Laboratory: Using Lean-Computing Technology to Merge Theory-Based Learning and Experimentation," *Proceedings of the ASEE Conference and Exposition*.
- ❖ Tarawneh, C., Kypuros, J. A., Wilson, B. M., Snyder, T. W., Gonzalez, B. A., and Fuentes, A. A., 2009, "A collaborative on-track field test conducted to verify the laboratory findings on bearing temperature trending," *Proceedings of the 2009 ASME Joint Rail Conference*.
- ❖ Kypuros, J.A. and Tarawneh, C., 2008, "Multimodal Modules for Non-Calculus-Based Engineering Mechanics Curriculum," accepted for publication in the *Proceedings of the Frontiers in Education Conference*.
- ❖ Kypuros, J.A. and Connolly, T.J., 2008, "Student-Configurable Web-Accessible Virtual Systems for System Dynamics and Controls Courses," *Computer Applications in Engineering Education*, 16(2), pp. 92-104.
- ❖ Vaquez, H., Kypuros, J., and Villanueva, R., 2008, "Implementing and Validating Digital Controllers," *Proceedings of the ASEE-Gulf Southwest Regional Conference*.
- ❖ Kypuros, J.A. and Tarawneh, C., 2007, "Multimodal Assessment Instruments for Dynamics," *Proceedings of the ASEE-Gulf Southwest Regional Conference*.
- ❖ Kypuros, J.A. and Connolly, T.J., 2007, "Animating Virtual Dynamic Systems using MATLAB/Simulink®," in the *Proceedings of the ASEE-Gulf Southwest Regional Conference*.
- ❖ Fuentes, A.A., Freeman, R., Crown, S., and Kypuros, J.A., 2006, "Desegregated Learning: An Integrative Framework for Programs of Study," *New Directions for Teaching and Learning Journal*, 2006(128), pp. 17-32.
- ❖ Kypuros, J.A. and Connolly, T.J., 2005, "Collaborative Experimentation and Simulation: A Pathway to Improving Student Conceptualization of the Essentials of System Dynamics and Control Theory," *Proceedings of the ASEE Annual Conference*, pp. 1855-1864.
- ❖ Kypuros, J.A., Colson, R., and Muñoz, A., 2004, "Improved Temperature Dynamic Model of Turbine Subcomponents for Facilitation of Generalized Tip Clearance Control," submitted as NASA Contractors Report and will appear as a future NASA Technical Memorandum.
- ❖ Kypuros, J.A. and R.G. Longoria, 2003, "Model synthesis of switched systems using variable structure system theory," *ASME Journal of Dynamic Systems, Measurement, and Control*, 125(4), pp. 618-629.
- ❖ Melcher, K.J. and Kypuros, J.A., 2003, "A first Principles-Based Model for Predicting Turbine Tip clearance in Commercial Aircraft Engines," *Proceedings of the XVIth International Symposium on Air Breathing Engines*.
- ❖ Kypuros, J.A. and Melcher, K.J., 2003, "A Reduced Model for Prediction of Thermal and Rotational Effects on Turbine Tip Clearance," NASA/TM—2003-212226.
- ❖ Kypuros, J.A. and Longoria, R.G., 2002, "Variable Fidelity Modeling of Vehicle Dynamics Using an Element Activity Metric," *Proceedings of the ASME IMECE Automated Modeling Symposium*, pp. 524-534.
- ❖ Kypuros, J.A. and Marrufo, E., 2002, "A Compliant Arterial-Segment Model for Study of Wall Shear Stress Modulation Via Vasodilation," *Proceedings of the ASME IMECE Advances in Bioengineering Symposium*, pp. 361-362.

- ❖ Longoria, R.G., Kypuros, J.A., and Paynter, H.M., 1997, "Bond Graph and Wave-Scattering Models of Switch Power Conversion," *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics (IEEE/SMC 1997)*, pp. 1522-1526.

Honors and Awards:

- 2011 College of Engineering and Computer Science Nominee, UTPA, *Faculty Excellence Award for Teaching*
- 2004 Texas Space Grant Consortium, *New Investigator Program Award*
- 2002 NASA, *Summer Faculty Fellow*
- 2002 NASA, Faculty Award for Research, *Early Career Award*
- 1996 Princeton University, *The Frederick Douglas Service Award*