

MECHANICAL ENGINEERING

GRADUATE DIRECTOR: ROBERT KUKTA
DEPARTMENT CHAIR: FU-PEN CHIANG

❖ Grants, Fellowships, and Awards

- Cao, Changhong.** (2010) NSF Graduate Student Fellowship to attend 2010 ASME International 1st Global Congress on Nano Engineering for Medicine & Biology, \$220. *NSF Summer Institute*, Houston, TX.
- Chen, Xiaoming.** (2010) NSF Graduate Student Fellowship to attend 2010 ASME International 1st Global Congress on Nano Engineering for Medicine & Biology, \$220. *NSF Summer Institute*, Houston, TX.
- Chung, C.** (2009) MSEC2009 Student Travel Support, \$300, *ASME 2009 International Manufacturing Science and Engineering Conference*, West Lafayette, IN.
- Lu, Cunyou.** (2010) NSF Graduate Student Fellowship to attend 2010 ASME International 1st Global Congress on Nano Engineering for Medicine & Biology, \$220. *NSF Summer Institute*, Houston, TX.
- Tang, Xiudong.** (2009) Imagine Cup Student Competition 2009, \$10,000. *Microsoft*, Cairo, Egypt.
- Wu, Jun.** (2009) MSC Simulation Software Award/Best Paper Award, \$1,000, *ASME 33rd Mechanisms and Robotics Conference*, San Diego, CA.
- Zhang, Kunbo.** (2009) NSF CMMI 2009 Student Registration, Hotel and Travel Support, \$1500. *2009 NSF Civil, Mechanical and Manufacturing Innovation Grantees and Research Conference*, Honolulu, HI.

❖ Jointly Authored Publications/Research Reports/Reviews

- Zhao, W., Cao, C., Korach, C.S. (2010) Measurement of Structural Variations in Enamel Nanomechanical Properties using Quantitative Atomic Force Acoustic Microscopy. *Proceedings of the 2010 SEM Annual Conference and Exposition*, Indianapolis, IN.
- Choi, J.H.** and Korach, C.S. (2009) Nanoscale Defect Generation in CMP of Low-k/Copper Interconnect Patterns. *Journal of the Electrochemical Society* 156: H961.
- Korach, C.S., Reiner, A. and **Cao, C.** (2009) Measurement of Vertically Aligned Carbon Nanotube Array Bulk Friction in Contact with Silicon. *Proceedings of the 2009 STLE Annual Meeting and Exhibition*, Orlando, FL.
- Bhagavat, S., Liberato, J.C., **Chung, C.**, and Kao, I., (In Press) Effect of Abrasive Grits in Slurries on Free Abrasive Machining (FAM) Processes. *International Journal of Machine Tools and Manufacture*.
- Chung, C.** and Kao, I. (2009) Numerical Studies on the Frequency Response of Damped Axially Moving Wire. *Proceedings of ASME 2009 International Design Engineering Technical Conference & Computers and Information in Engineering Conference*, San Diego, CA.
- Darvishi, S.** and Cubaud, T. (2010) Viscous Core-Annular Flows in Microfluidic Chambers. *Proceedings of ASME 2010, 3rd Joint US-European Fluids Engineering Summer Meeting and 8th International Conference on Nanochannels, Microchannels, and Minichannels*, Montreal, QB.

Mechanical Engineering

- Purwar, A., Wu, J., **Gupta, A.**, and Ge, Q.J. (2010) A Visual, Interactive Approach to Synthesis of Spherical 6R Closed Chains for Rational Motions Via Constraint Manifold Modification. *Proceedings of ASME 2010 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference 28874*. Montreal, QB.
- Han, X.** and Huang, P.S. (2009) Combined stereovision and phase shifting method: a new approach for 3D shape measurement, *Proceedings of SPIE 7389*: 125.
- Han, X.** and Huang, P.S. (2009) Combined stereovision and phase shifting method: use of a visibility-modulated fringe pattern. *Proceedings of SPIE 7389*: 131.
- Han, X.** and Huang, P.S. (2009) Combined Stereovision and Phase Shifting Method: Use of a Color Visibility-Modulated Fringe Pattern. *Proceedings of SPIE 7432*: 32.
- Han, X.** and Huang, P.S. (2009) A Portable 3-D Shape Measurement System Based on the Combined Stereovision and Phase Shifting Method. *Proceedings of SPIE 7432*: 36.
- Lopez-Pamies, O., Idiart, M.I., **Li, Z.** (In Press) On microstructure evolution in fiber-reinforced elastomers and implications for their mechanical response and stability. *Journal of Engineering Materials and Technology*.
- Rastegar, J., **Murray, R.** (2009) Development and Commercialization Strategy for Piezoelectric Energy-Harvesting Power Sources for Gun-Fired Munitions. *SPIE 16th Annual International Symposium on Smart Structures and Materials 7645*: 1, San Diego, CA.
- Rastegar, J., **Murray, R.**, Pereira, C., and Nguyen, H-L. (2009) Energy-Harvesting Power Sources for Very-High-G Gun-Fired Munitions. *SPIE 16th Annual International Symposium on Smart Structures and Materials 7643*: 12, San Diego, CA.
- Rastegar, J., **Murray, R.** (2009) Novel Two-Stage Piezoelectric-Based Electrical Energy Generators for Low and Variable Speed Rotary Machinery. *SPIE 16th Annual International Symposium on Smart Structures and Materials 7643*: 11, San Diego, CA.
- Korach, C.S., **Reiner, A.** and Cao, C. (2009) Measurement of Vertically Aligned Carbon Nanotube Array Bulk Friction in Contact with Silicon. *Proceedings of the 2009 STLE Annual Meeting and Exhibition*, Orlando, FL.
- Tang, Xiudong** and Zuo, Lei. (2009) Towards MESO and Macro Scale Energy Harvesting of Vibration. *Proceedings of the 2009 ASME International Mechanical Engineering Congress and Exposition*, Lake Buena Vista, FL.
- Zuo, Lei and **Tang, Xiudong**. (2009) Circuit optimization and vibration analysis of electromagnetic energy harvesting systems. *Proceedings of the 2009 ASME Design Engineering Technical Conference*, San Diego, CA.
- Tang, Xiudong** and Zuo, Lei. (2010), Passive, Active and Semi-active Series Tuned Mass Dampers. *Proceedings of SPIE-The International Society for Optical Engineering: Active and Passive Smart Structures and Integrated Systems*, San Diego, CA.
- Tang, Xiudong** and Zuo, Lei. (2010), Self-powered Active Control of Structures with TMDs. *IMAC XXVIII Conference and Exposition on Structural Dynamics: Structural Dynamics and Renewable Energy*, Jacksonville, FL.
- Tang, Xiudong** and Zuo, Lei. (2010) Regenerative Semi-Active Control of Tall Building Vibration with Series TMDs. *Proceedings of America Control Conference*, Baltimore, MD.
- Purwar, A., **Wu, J.**, Gupta, A., and Ge, Q.J. (2010) A Visual, Interactive Approach to Synthesis of Spherical 6R Closed Chains for Rational Motions Via Constraint Manifold Modification. *Proceedings of ASME 2010 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference 28874*. Montreal, QB.
- Wu, J.**, Purwar, A., and Ge, Q.J. (In Press) Interactive Dimensional Synthesis and Motion Design of Planar 6R Closed Chains via Constraint Manifold Modification. *ASME Journal of Mechanisms and Robotics*.

- Wu, J.,** Ge, Q.J., Su, Hai-Jun, Gao, F. (2010) Kinematic Acquisition of Geometric Constraints for Task Centered Mechanism Design. *Proceedings of ASME 2010 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference 28287*. Montreal, QB.
- Wu, J.,** Ge, Q.J., Gao, F., Guo, W.Z. (2010) On the Extension of a Fourier Descriptor Based Method for Four-Bar Linkage Synthesis for Generation of Open and Closed Paths. *Proceedings of 2010 ASME Mechanisms and Robotics Conference 29028*. Montreal, QB.
- Wu, J.,** Purwar, A., and Ge, Q.J. (2009) Interactive Dimensional Synthesis and Motion Design of Planar 6R Closed Chains via Constraint Manifold Modification. *Proceedings of 2009 ASME Mechanisms and Robotics Conference 87818*. San Diego, CA.
- Wu, J.,** Ge, Q.J., Gao, F. (2009) An Efficient Method for Synthesizing Crank-Rocker Mechanisms for Generating Low-Harmonic Curves. *Proceedings of 2009 ASME Mechanisms and Robotics Conference 87140*. San Diego, CA.
- Ge, Q.J., **Wu, J.,** Purwar, A., and Gao, F. (2009) Kinematic Convexity of Planar Displacements Based On an Approximately Bi-Invariant Metric. *Proceedings of 2009 ASME Mechanisms and Robotics Conference 87812*. San Diego, CA.
- Wu, J.,** Ge, Q. J., and Gao, F. (2010) On Representation and Identificaiton of Geometric Constraints Using Fourier Descriptors. *Proceedings of the 2010 International Conference on Mechanisms and Machine Science*, Shanghai, China.
- Zhao, W.,** Cao, C., Korach, C.S. (2010) Measurement of Structural Variations in Enamel Nanomechanical Properties using Quantitative Atomic Force Acoustic Microscopy. *Proceedings of the 2010 SEM Annual Conference and Exposition*, Indianapolis, IN.
- Zhao, W.** and Korach, C.S. (2009) Measurement of Epoxy Stiffness by Atomic Force Acoustic Microscopy. *Proceedings of the 2009 ASME International Mechanical Engineering Congress and Exhibition*, Lake Buena Vista, FL.

❖ **Abstracts, Conferences/Colloquia, Presentations, Symposiums, Workshops**

- Cao, C.** and Korach, C.S. (2009) Microscale Damage and Erosion in Tooth Enamel. *2009 Society of Experimental Mechanics Annual Meeting*. Albuquerque, NM.
- Korach, C.S., Reiner, A. and **Cao, C.** (2009) Measurement of Vertically Aligned Carbon Nanotube Array Bulk Friction in Contact with Silicon. *2009 STLE Annual Meeting and Exhibition*. Orlando, FL.
- Capria, C.** and Kao, I. (2009) International Research and Education Collaboration and the Game of Baseball Have Much in Common. *International Conference on Engineering Education and Research*. Seoul, Korea.
- Korach, C.S., **Choi, J.H.,** Kim, C. and Neiman, A. (2009) Characterization and Properties of Yeast Spore Walls by Scanning Probe Microscopy. *2009 STLE Annual Meeting and Exhibition*. Orlando, FL.
- Chung, C.,** and Melendez, G., and Kao, I. (2009) Experimental Study of Lapping Using Mixed Abrasive Grits. *ASME 2009 International Manufacturing Science and Engineering Conference*. West Lafayette, IN.
- Cubaud, T. and **Darvishi, S.** (2009) Folding of Capillary Threads in Microfluidic Networks. *62nd Annual Meeting of the American Physical Society - Division of Fluid Dynamics*. Minneapolis, MN.
- Darvishi, S.** and Cubaud, T. (2009) Lubrication Failure of Viscous Threads in Microfluidic Chambers. *62nd Annual Meeting of the American Physical Society - Division of Fluid Dynamics*. Minneapolis, MN.

Mechanical Engineering

- Chung, C., and **Melendez, G.**, and Kao, I. (2009) Experimental Study of Lapping Using Mixed Abrasive Grits. *ASME 2009 International Manufacturing Science and Engineering Conference*. West Lafayette, IN.
- Rastegar, J., **Murray, R.** (2010) A Review of Two Patents Relating to Novel Energy Harvesting Techniques to Provide Electrical Power On-Board Gun-Fired Projectiles. *ASME IDETC Session: MR-9-1 Review of Recent Mechanical System and Device Patents*. Montreal, QB.
- Murray, R.**, Rastegar, J. (2010) A Review of Three Patents Relating to the Development of Novel Inertia-Driven Mechanisms for Igniters On-Board Gun-Fired Munitions. *ASME IDETC Session: MR-9-1 Review of Recent Mechanical System and Device Patents*, Montreal, QB.
- Korach, C.S., **Reiner, A.** and Cao, C. (2009) Measurement of Vertically Aligned Carbon Nanotube Array Bulk Friction in Contact with Silicon. *2009 STLE Annual Meeting and Exhibition*. Orlando, FL.
- Tang, Xiudong** and Zuo, Lei. (2009) Towards MESO and Macro Scale Energy Harvesting of Vibration. *Advanced Energy Conference*. Hauppauge, NY.
- Tsai, C.**, Kao, I., Yoshimoto, K., Higashimori, M. and Kaneko, M. (2009) An Experimental Study and Modeling of Loading and Unloading of Nonlinear Viscoelastic Contacts. *International Conference on Intelligent Robots and Systems (IROS)*. St. Louis, MO.
- Tsai, C.** and Kao, I. (2009) The Latency Model for Viscoelastic Contact Interface in Robotics: Theory and Experiments. *International Conference on Robotics and Automation (ICRA)*. Kobe, Japan.
- Korach, C.S., **Sha, O.** and Zhao, W. (2009) The Effect of pH Levels and Exposure Times on Polyurethane Scratch Resistance. *2009 STLE Annual Meeting and Exhibition*. Orlando, FL.
- Sun, R.** and Cubaud, T. (2009) Carbon Dioxide and Water Multiphase Flow in Microchannels. *62nd Annual Meeting of the American Physical Society - Division of Fluid Dynamics*. Minneapolis, MN.
- Wu, J.**, Ge, Q.J., Su, Hai-Jun, Gao, F. (2010) Kinematic Acquisition of Geometric Constraints for Task Centered Mechanism Design. *2010 ASME Mechanisms and Robotics Conference*. Montreal, QB.
- Wu, J.**, Ge, Q.J., Gao, F., Guo, W. Z. (2010) On the Extension of a Fourier Descriptor Based Method for Four-Bar Linkage Synthesis for Generation of Open and Closed Paths. *2010 ASME Mechanisms and Robotics Conference*. Montreal, QB.
- Wu, J.**, Purwar, A., and Ge, Q.J. (2009) Interactive Dimensional Synthesis and Motion Design of Planar 6R Closed Chains via Constraint Manifold Modification. *2009 ASME Mechanisms and Robotics Conference*. San Diego, CA.
- Wu, J.**, Ge, Q.J., Gao, F. (2009) An Efficient Method for Synthesizing Crank-Rocker Mechanisms for Generating Low-Harmonic Curves. *2009 ASME Mechanisms and Robotics Conference*. San Diego, CA.
- Xionghui, Lu** and Xu, Zhong. (2009) Robotic MMT for Data Center Thermal Mapping and Energy Management. *Advanced Energy Conference, 2009*. The Hyatt Regency Long Island, Hauppauge, NY.
- Zhao, W.** and Korach, C.S. (2009) Environmental Effects on Carbon Fiber Reinforced Epoxy Composites Measured by Atomic Force Acoustic Microscopy. *2009 ASME International Mechanical Engineering Conference and Exposition*. Lake Buena Vista, FL.
- Zhao, W.** and Korach, C.S. (2009) Measurement of Epoxy Stiffness by Atomic Force Acoustic Microscopy. *2009 ASME International Mechanical Engineering Conference and Exposition*. Lake Buena Vista, FL.
- Zhao, W.** and Korach, C.S. (2009) Measurement of Fiber Reinforced Composite Epoxy Stiffness by Atomic Force Acoustic Microscopy. *2009 Society of Experimental Mechanics Annual Meeting*. Albuquerque, NM.
- Korach, C.S., Sha, O. and **Zhao, W.** (2009) The Effect of pH Levels and Exposure Times on Polyurethane Scratch Resistance. *2009 STLE Annual Meeting and Exhibition*. Orlando, FL.

❖ **Software Developed**

Wu, Jun. (2009), DimSynth V1.0, Motion Design and Planar Closed 6R Single-Loop Chain Design. Stony Brook, NY.

❖ **Patents**

Rastegar, J., **Murray, R.**, Spinelli, T. (2009) Mechanical delay mechanisms for inertial igniters for thermal batteries and the like. US Patent #7,587,980.

Rastegar, J., **Murray, R.**, Spinelli, T. (2009) Multi-stage mechanical delay mechanisms for inertial igniters for thermal batteries and the like. US Patent #7,587,979.