



Exponent®

Engineering & Scientific Consulting

Jeffrey Kornuta, Ph.D., P.E.

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Professional Profile

Dr. Kornuta specializes in mechanical design and failure analysis with an emphasis on electromechanical and mechatronic equipment. His areas of expertise include instrumentation and control systems, dynamics and vibration, fluid mechanics, and thermodynamics.

Dr. Kornuta has investigated mechanical and electrical systems in the energy, aerospace, industrial, biomedical, and transportation sectors; as well as performed on-site inspections and laboratory test programs. Examples of equipment he has evaluated include turbines, generators, motors, pumps, compressors, and pipe joints, among others. Dr. Kornuta also has expertise in signal processing, system identification, and data science. His experience analyzing complex, multi-energy domain systems and diverse research background enable Dr. Kornuta to apply his expertise to a wide variety of equipment in the design, manufacturing, operation, and troubleshooting phases.

Dr. Kornuta also has hands-on experience with computer-aided design and manufacturing (CAD/CAM), manual and computer-controlled (CNC) mills and lathes, programmable logic controllers (PLCs), microcontrollers, analog and digital sensors, electric motors and actuators, motion control systems, and printed circuit board (PCB) design. Additionally, he has experience with various software applications and programming languages including MATLAB/Simulink, Mathematica, Python, R, FORTRAN, C/C++ for embedded systems, and finite element analysis (FEA) packages.

Prior to joining Exponent, Dr. Kornuta completed his doctoral research at the Georgia Institute of Technology where he studied lymphatic vessel pump function in response to dynamic mechanical loading. To this end he designed and built a novel test apparatus capable of imposing dynamic loads on excised lymphatic vessels using a model predictive control (MPC) algorithm implemented on embedded hardware. In addition, during his master's thesis research, Dr. Kornuta evaluated the feasibility of using a momentum exchange tether as a hypersonic parachute during reentry for human space missions. In particular, he quantified reductions in heat loads and temperatures on a reentry capsule as a function of various system parameters using self-developed multi-body dynamics and heat transfer simulation software.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Georgia Institute of Technology, 2014

M.S., Mechanical Engineering, Louisiana State University, 2009

B.S., Mechanical Engineering, Louisiana State University, 2008

Graduate Certificate in Engineering Entrepreneurship, Earnest Scheller Jr. College of Business

College Honors Distinction, LSU Honors College

National Science Foundation Graduate Research Fellowship, 2010

Georgia Tech President's Fellowship, 2010

Louisiana Engineering Foundation Vincent A. Forte Fellowship, 2008

Tau Beta Pi Engineering Honor Society, 2007

Omicron Delta Kappa Leadership Honor Society, 2007

Eagle Scout, 2000

Licenses and Certifications

Certified Vibration Analyst (CVA)

Prior Experience

Graduate Research Assistant, Woodruff School of Mechanical Engineering at Georgia Tech, 2009-2014

Graduate Research and Teaching Assistant, LSU Mechanical Engineering Department, 2008-2009

Thermodynamics Tutor, LSU Mechanical Engineering Department, 2005-2007

Training and Development Intern, The Shaw Group, Summer 2005

Remote Site Specialist, Safety Council of Baton Rouge, Summer 2004

Professional Affiliations

American Society of Mechanical Engineers — ASME (Member)

American Institute of Aeronautics and Astronautics — AIAA (Senior Member)

- Associate Member: Guidance, Navigation, and Control (GN&C) Technical Committee

Publications

Kornuta JA, Ames NM, Louie MW, Veloo P, Rovella T. Uncertainty Quantification of Nondestructive Techniques to Verify Pipeline Material Strength. Proceedings of the 2018 12th International Pipeline Conference, Vol. 1. Calgary, Alberta, Canada. September 24–28, 2018.

Kupkovits R, Kornuta JA, Kennedy E. Review of Risk and Assessment of Safety for Powered Conveyor Systems. Proceedings of the ASME 2017 International Mechanical Engineering Congress and Exposition, Vol. 14. Tampa, Florida, USA. November 3–9, 2017.

Kornuta JA, Kennedy E. Review of Hazards and Assessment of Safety Features for Agricultural Equipment. Proceedings of the ASME 2016 International Mechanical Engineering Congress and

Exposition, Vol. 14. Phoenix, Arizona, USA. November 11–17, 2016.

Kornuta JA, Nepiyushchikh Z, Gasheva OY, Mukherjee A, Zawieja DC, Dixon JB. Effects of dynamic shear and transmural pressure on wall shear stress sensitivity in collecting lymphatic vessels. *American Journal of Physiology - Regulatory, Integrative and Comparative Physiology* 2015; 309(9):R1122-R1134.

Kornuta JA, Dixon JB. Ex-vivo lymphatic perfusion system for independently controlling pressure gradient and transmural pressure in isolated vessels. *Annals of Biomedical Engineering* 2014; 42:8:1691-1704.

Nelson TS, Akin RE, Weiler MJ, Kassis T, Kornuta JA, Dixon JB. Minimally invasive method for determining the effective lymphatic pumping pressure in rats using near-infrared imaging. *American Journal of Physiology - Regulatory, Integrative and Comparative Physiology* 2014; 306(5):R281-R290.

Kornuta JA, Nipper ME, Dixon JB. Low-cost microcontroller platform for studying lymphatic biomechanics in vitro. *Journal of Biomechanics* 2013; 46:183-186.

Kornuta JA, Guo SM. Momentum exchange tether as a hypersonic parachute during reentry for human missions. *Journal of Spacecraft and Rockets* 2010 Aug; 47(4):571-579.

Kornuta JA, Guo SM. Rocket nozzle payload design for a high altitude student platform. *International Journal of Mechanical Engineering Education* 2008 July; 36(3):235-247(13).

Presentations

Kornuta JA, Martin P, Louie MW, Rovella T, Veloo P. An Evaluation of Instrumented Indentation Testing to Estimate Yield and Tensile Strength. The 31st International Pipeline Pigging and Integrity Management Conference (PPIM), Houston, TX, USA 2019.

Dixon JB, Kornuta JA, Nepiyushchikh Z, Zawieja DC. Utilization of a feedback-controlled lymphatic perfusion system for determining the effects of shear rate and pressure on lymphatic wall shear stress sensitivity. 7th World Congress of Biomechanics, Boston, MA, July 6-11, 2014.

Kornuta JA, Salazar E, Danielak Z, Dixon JB. Low-cost microcontroller platform for real-time control of an isolated lymphatic vessel perfusion device. BMES Conference, Atlanta, GA, October 24-27, 2012.

Kornuta JA, Dixon JB. Isolated vessel perfusion system design for independently controlling hoop stress and shear stress. ASME 2012 Summer Bioengineering Conference, Fajardo, Puerto Rico, June 20-23, 2012.

Kornuta JA, Nipper ME, Korneva A, Dixon JB. An in-vitro model to quantify the effects of fluid shear stress on lymphatic pump function. ASME Summer Bioengineering Conference, Farmington, PA, June 22-25, 2011.

Dixon JB, Kornuta JA, Kassis T. Bioengineered tools for quantifying lymphatic function in lipid transport. BMES Conference, Austin, TX, October 6-9, 2010.

Kornuta JA, Ho DV, Peltier LE, Sajan R. Micro Air Vehicle (MAV): Numerical optimization of a coaxial rotor blade design. AIAA 2008 Region IV Student Conference, Team Division (Second Place Winner).

Peer Reviews

Journal of Guidance, Control, and Dynamics