

PHILLIP ANDREW KRETH

Contact Information Withheld for Online Posting

CITIZENSHIP

United States Citizen

EDUCATION

Doctor of Philosophy, Mechanical Engineering, 3.86/4.0 GPA August 2015
Florida State University, Tallahassee, FL

Dissertation: *High-Frequency, Resonance-Enhanced Microactuators with Active Structures for High-Speed Flow Control*
Adviser: Prof. Farrukh Alvi

Bachelor of Science, Mechanical Engineering, 3.99/4.0 GPA May 2008
Florida State University, Tallahassee, FL

Graduated *Summa Cum Laude*
Technical Focus: Thermal-Fluid Sciences

TECHNICAL SKILLS & EXPERTISE

Experimental Fluid Mechanics

- Non-intrusive flow visualizations including schlieren and shadowgraph (macro- & micro-scale and high-speed)
- Unsteady pressure, acoustic, micro-scale displacement, and phase-conditioned measurements
- Particle Image Velocimetry (PIV) and surface flow visualizations including oil flow and tufts
- Experiment design, planning, fabrication, and assembly in benchtop and wind tunnel facilities
- Wind tunnel testing with various models in subsonic and supersonic flow regimes

WORK EXPERIENCE

Florida Center for Advanced Aero-Propulsion (FCAAP) August 2015 – Present
Post-Doctoral Research Associate / Adjunct Assistant Professor Tallahassee, FL

- Research interests: aeroacoustics, shock wave/boundary layer interactions, cavity flows
- Development of advanced diagnostics: LED-based high-speed (500 kHz) schlieren and shadowgraph
- Investigating the design of unsteady actuators as an acoustic source for the NASA Langley GFIT (NIA 2A85)
- Mentoring graduate and undergraduate students in research

Florida State University (FSU) August 2008 – August 2015
Graduate Research Assistant Tallahassee, FL

- Focus: Active Flow Control (AFC) and the design of microactuators for AFC in high-speed flows
- Design and evaluation of microactuators that produce pulsed supersonic flows from 100 Hz to 50 kHz
- Characterization using microphones, unsteady pressure transducers, and optical diagnostics
- Flow visualizations using microsclieren systems (laser- and LED-based, conventional, and high-speed)
- Conducted Particle Image Velocimetry measurements on $\mathcal{O}(100 \mu\text{m})$ supersonic flows
- Implemented and tested microactuators in a blow-down supersonic wind tunnel facility (Mach 1.5)
- Performed feedback control experiments using LabVIEW and dSPACE Control Desk
- Created, organized, and managed an online inventory of lab equipment and data storage server

Advanced Aero Propulsion Laboratory (AAPL) May 2007 – August 2008
Undergraduate Research Assistant Tallahassee, FL

- Completed senior design project: Active Flow Control on a Fixed Wing UAV (group leader)
- Flow visualizations and pressure measurements in a closed-circuit, subsonic wind tunnel facility
- Experiments included flight testing to evaluate actuator performance in flight
- Assisted graduate students with research in blow-down supersonic wind tunnel facility

TEACHING EXPERIENCE

EML4711 & 5710 – Introduction to Gas Dynamics

Co-Instructor

Fall 2015

Florida State University

- Fundamental and practical understanding of the basic principles of compressible fluid flows
- Topics covered – acoustic and Mach waves, isentropic flows, normal and oblique shock waves, Prandtl-Meyer expansions, and compressible flows with friction and heat addition
- Examples of practical applications – supersonic nozzles, wind tunnels, and diffusers

EML4304L – Experiments in Thermal & Fluid Sciences

Laboratory Teaching Assistant

2008 – 2009 & 2013 – 2015

Florida State University

- TA in an undergraduate course offered to Junior and Senior students in Mechanical Engineering
- Instructed and assisted students on measurement techniques and experiment execution
- LabVIEW-based data acquisition using pressure transducers, thermocouples, and motor controllers
- Lectured and wrote quizzes and tests for average class sizes of 80 students (2013 – 2015)
- Designed and constructed a new pipe flow experiment (2009)

CONSULTATION

FullScaleNANO, Inc.

Engineering Consultant / Founding Member

December 2012 – Present

Tallahassee, FL

- Designed a MATLAB-based user interface for NanoMet, a nanomaterials image-based, dimensional analysis software
- Collaborative work with Georgia Institute of Technology led to an NSF SBIR Phase I grant
- Developed new data organization and visualization scripts that improved customer satisfaction

PUBLICATIONS

Kreth, P., Ali, Y. M., Fernandez, E. J., and Alvi, F. S., “Velocity Field Measurements on High-Frequency, Supersonic Microactuators.” *Experiments in Fluids*, submitted for review.

Kreth, P., Alvi, F. S., Reese, B. M., and Oates, W. S., “Control of High-Frequency Micro-Actuators using Active Structures.” *Smart Materials and Structures*, **24** (2), 1–15, 2015.

Kreth, P. and Alvi, F. S., “Microjet-Based Active Flow Control on a Fixed Wing UAV.” *Journal of Flow Control, Measurement & Visualization*, **2** (2), 32–41, April 2014.

Kreth, P., Gustavsson, J. P. R., Alvi, F. S., and Oates, W., “Studies on the Resonance-Enhanced Micro-Actuator with Active Structures.” Proc. of *6th AIAA Flow Control Conference*, New Orleans, LA, 2012.

Kreth, P., Solomon, J. T., Alvi, F. S., and Oates, W., “Resonance-Enhanced High-Frequency Micro- Actuators with Active Structures.” Proc. of *17th AIAA/CEAS Aeroacoustics Conference (32nd AIAA Aeroacoustics Conference)*, Portland, OR, 2011.

Kreth, P., Alvi, F., Kumar, V., and Kumar, R., “Microjet Based Active Flow Control on a Fixed Wing UAV.” Proc. of *48th AIAA Aerospace Sciences Meeting*, Orlando, FL, 2010.

CERTIFICATIONS

Tallahassee’s Economic Development Council Entrepreneurial Excellence Program, 2013

Program for Instructional Excellence (PIE), 2012

Engineer in Training (NCEES), 2007

HONORS & AWARDS

Nominated for University Outstanding Teaching Assistant Award, 2014

Graduated *Summa Cum Laude*, 2008

University Honors Program Honors Medallion, 2008

AIAA Student Achievement Award, 2008

Best Project in ME Senior Design, 2008

Presidents and Deans Lists, 2004 – 2008