Nikolas S. Zawodny

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PROFILE

Doctorate in aerospace engineering focusing on identification of physical noise source generation mechanisms for flow around representative landing gear geometries.

EDUCATION

Doctor of Philosophy in Aerospace Engineering — August 2012
University of Florida, Gainesville, FL
- Dissertation: "Aeroacoustic Characterization of Scaled Canonical Nose Landing Gear Configurations."
- Advisor: Dr. Louis Cattafesta III

Master of Science in Aerospace Engineering — December 2009
University of Florida, Gainesville, FL
- Overall GPA: 3.9/4.0

Dual Bachelor of Science in Mechanical & Aerospace Engineering — May 2007
University of Florida, Gainesville, FL
- Overall GPA: 3.77/4.0

EXPERIENCE

Graduate Research Assistant, Interdisciplinary Microsystems Group — September 2007 – Present
University of Florida, Gainesville, FL
- Design and fabrication of a representative nose landing gear sub-system for aeroacoustic characterization and testing of airframe noise reduction concepts. Experimental characterization of turbulent flow field using three-dimensional particle image velocimetry (PIV) and laser Doppler velocimetry (LDV) techniques.
- Development of a recessed unsteady surface pressure transducer package for use in aerodynamic flows. Increased functionality of low cost audio microphones in high-pressure loading flow scenarios. Design optimization of packages assisted using lumped-element modeling (LEM) and transfer matrix (TM) estimation methods.
- Development of an experimental acoustic "point" source in air using a frequency-doubled Nd:YAG pulsed laser. Application of point source concept for the calibration and shear layer correction of a phased microphone array for aeroacoustic testing in an anechoic wind tunnel.
- Design, fabrication, and test validation of a series of phased microphone arrays. Series of calibration experiments to validate functionality of various beamforming algorithms. Array designs have progressed from solid plate arrays consisting of flush-mounted low cost audio microphones to near acoustically "transparent" array frames consisting of extruded high-quality free-field microphones.
- Aerodynamic and aeroacoustic testing on a 25% scale high-fidelity replica of a Gulfstream G550 nose landing gear. Experimental measurements include steady and unsteady surface pressures, three-dimensional flow-field analyses using LDV, and far-field acoustic analysis including noise source localization using microphone arrays. In collaboration with Gulfstream Aerospace and NASA as part of the AIAA Benchmark problems for Airframe Noise Computations (BANC) workshops.

Research Intern, Computational Aerosciences Branch — June 2011 – August 2011
NASA Langley Research Center (LaRC), Hampton, VA
- Computational fluid dynamic (CFD) simulations on a representative landing gear geometry using PowerFLOW software, a novel Lattice-Boltzmann based simulation methodology.
- Composition of a "Suggested Practices and Lessons Learned" set of documentation for future NASA users of the PowerFLOW software.

Safety Representative, Interdisciplinary Microsystems Group — May 2009 – Present
University of Florida, Gainesville, FL
- Safety representative for fluid dynamics laboratory and wind tunnel facilities.
- Perform semesterly training sessions for new group members.

Teaching Assistant, Data Measurement & Analysis August 2009 – December 2009
University of Florida, Gainesville, FL

- Assisting on- and off-campus students through Electronic Delivery of Graduate Engingeering (EDGE).
- Holding on-line office hour sessions for off-campus students.

Teaching Assistant, Principles of Aerodynamics January 2009 – May 2009
University of Florida, Gainesville, FL

- Instruction of bi-weekly, 1-hour recitation sessions consisting of 30-40 students each.
- Working problems and explaining theory for current class subject material.

Engineering Intern, 777 Aircraft Structures Group May 2006 – August 2006
Boeing Commercial Airplanes, Everett, WA

- Stress analysis on structural components of aft fuselage of Boeing 777 aircraft.
- Development of an interactive spreadsheet application for recording and monitoring of high-stress regions of aircraft fuselage.

Training

- **University of Florida**, Gainesville, FL August 2007 – Present
  Graduate Level Coursework: Physical Acoustics, Aerodynamically-Generated Sound, Data Measurement & Analysis, Viscous Fluid Flow, Introduction to Compressible Flow, Turbulent Fluid Flow, Computational Fluid Dynamics, Laser-Based Diagnostics, Convective Heat Transfer, Finite Element Analysis.

- **Exa Corporation**, Burlington, MA March 2011
  Hands-on training of PowerFLOW computational fluids software.

Skills

MATLAB, Visual Studio C++, PointWise, PowerFLOW, Pro-Engineer, Abaqus/CAE

Publications

Journal

- C. Bahr, **N. S. Zawodny**, F. Liu, D. Wetzel, B. Bertolucci, and L. Cattafesta. Shear Layer Time-Delay Correction using a Non-Intrusive Acoustic Point Source. *International Journal of Aeroacoustics*, 10(5):497–530, 2011.
- T. Yardibi, C. Bahr, **N. S. Zawodny**, F. Liu, LN Cattafesta III, and J. Li. Uncertainty Analysis of the Standard Delay-and-Sum Beamformer and Array Calibration. *Journal of Sound and Vibration*, 329(13):2654–2682, 2010.
- T. Yardibi, J. Li, P. Stoica, **N. S. Zawodny**, and L.N. Cattafesta III. A Covariance Fitting Approach for Correlated Acoustic Source Mapping. *The Journal of the Acoustical Society of America*, 127(5):2920–2931, 2010.
- T. Yardibi, **N. S. Zawodny**, C. Bahr, F. Liu, L. Cattafesta, and J. Li. Comparison of Microphone Array Processing Techniques for Aeroacoustic Measurements. *International Journal of Aeroacoustics*, 9(6):732–762, 2010.

Conference

- C. Bahr, **N. S. Zawodny**, B. Bertolucci, and K. Woolwine. Measurement of Phased Array Point Spread Functions for use with Beamforming. In *17th AIAA/CEAS Aeroacoustics Conference*, number 2011-2767, Portland, Oregon, 2011.
- C. Bahr, **N. S. Zawodny**, T. Yardibi, F. Liu, D. Wetzel, B. Bertolucci, and L. Cattafesta. Shear Layer Correction Validation using a Non-Intrusive Acoustic Point Source. In *16th AIAA/CEAS Aeroacoustics Conference*, number 2010-3735, Stockholm, Sweden, 2010.
- T. Yardibi, C. Bahr, **N. S. Zawodny**, F. Liu, L.N. Cattafesta III, and J. Li. Uncertainty Analysis of the Standard Delay-and-Sum Beamformer and Array Calibration. In *15th AIAA/CEAS Aeroacoustics Conference*, number 2009-3120, Miami, FL, 2009.

- **N. S. Zawodny**, F. Liu, T. Yardibi, L. Cattafesta, D. H. Neuhart, and T. Van De Ven. A Comparative Study of a 1/4-Scale Gulfstream Aircraft Nose Gear Model. In *15th AIAA/CEAS Aeroacoustics Conference*, number 2009-3153, Miami, FL, 2009.

Honors

- NASA Aeronautics Scholarship recipient — 2011 – 2012
- University of Florida Alumni fellow — 2007 – 2011
- University Scholars Program participant — 2006 – 2007
- AIAA student member — 2005 – Present