

Nathan J. Washuta, Ph.D., P.E.

843-953-0689
nwashuta@citadel.edu

3 Jenkins Ave
Charleston, SC 29403

EDUCATION

The University of Maryland, College Park, MD

Ph.D., Mechanical Engineering **August 2016**

- Dissertation: *Air Entrainment in the Turbulent Ship Hull Boundary Layer*
- Advisor: Dr. James H. Duncan
- Concentration: Thermal, Fluid and Energy Sciences
- GPA: 3.89 (4.0 scale)

B.S., Mechanical Engineering **May 2010**

- With Honors in Mechanical Engineering
- GPA: 3.57 (4.0 scale)

RESEARCH INTERESTS

- Engineering Education, Fluid Mechanics, Hydrodynamics, Turbulence, Free-Surface Flows, Water Waves, Multi-phase Flows, Experimental Methods, Optical Measurement Techniques, Image Processing, Orbital Mechanics

TEACHING AND MENTORSHIP EXPERIENCE

The Citadel, Charleston, SC
Assistant Professor

August 2019 to Present

- Taught Mechanical Engineering courses on a 4/4 teaching load

Instructor

August 2017 to August 2019

- Taught Mechanical and Electrical Engineering courses on a 5/5 teaching load
- Acted as course director in charge of curriculum development and ABET assessment for MECH 102, MECH 325, and MECH 481
- Engineering Computer Applications (MECH 102), Thermal-Fluid Systems I (MECH 310), Thermal-Fluid Systems II (MECH 311) Computer Applications (MECH 325), Modeling/Analysis of Dynamic Systems (MECH 350), Heat Transfer (MECH 415), Senior Design I (MECH 481), Senior Design II (MECH 482), Graduate Computer Aided Design and Analysis (MECH 625/635), Computer Applications for Electrical Engineers (ELEC 206), Principles of Electrical Engineering (ELEC 208), Electronics Laboratory (ELEC 313)

Adjunct Professor

January 2017 to August 2017

- Taught Mechanical and Civil Engineering courses on a 3/3 teaching load
- Dynamics (CIVL 203), Engineering Computer Applications (MECH 102), Computer Applications (MECH 325)

Supplemental Instruction Leader

September 2016 to August 2017

- Held weekly review sessions to provide individual and group instruction
- College Physics I (PHYS 203), Analytical Geometry and Calculus III (MATH 231), Advanced Engineering Mathematics II (MATH 335), Precalculus (MATH 119)

Subject Area Tutor

September 2016 to August 2017

- Provided individual instruction for students in freshman through junior level courses in Math, Physics, and Engineering
- Tutored students in theory, example problems, and problem solving methodology
- College Physics I (PHYS 203), Physics with Calculus II (PHYS 222), Analytic Geometry and Calculus II & III (MATH 132 & MATH 231), Statics (CIVL 202), Dynamics (CIVL 203), Thermal-Fluid Systems I (MECH 310), Mechanical Engineering System

Design (MECH 460)

The University of Maryland, College Park, MD

Teaching Assistant

August 2013 to January 2014

- Mechanics II (ENES220)
- Provided individual instruction to students during weekly office hours
- Assisted second-year engineering students in beam design project
- Graded weekly homework assignments for over 100 students

Undergraduate Mentor

August 2012 to May 2016

- Mentored a number of high school, undergraduate, and international exchange students in research and problem-solving methods
- Provided day-to-day supervision while students worked on individual or collaborative projects

UMD Burgers Program for Fluid Dynamics Joint PIV Workshop, College Park, MD

Practical Session Instructor

May 2012

- Set up and performed a PIV demonstration for over 40 workshop attendees
- Devised experimental setup problem scenarios for interactive troubleshooting
- Answered questions relating to best practices and practical implementation of Particle Image Velocimetry

PROFESSIONAL
EXPERIENCE

The University of Maryland Hydrodynamics Lab, College Park, MD

Graduate Research Assistant

June 2010 to August 2016

- Supervisor: Dr. James H. Duncan
- Explored the role of turbulent velocity fluctuations in air entrainment processes that occur along the hull boundary layers of large naval ships using laboratory-scale experimental methods
- Designed and assembled a 10,000 gallon water tank and novel laboratory-scale belt device in order to study full velocity and length scales of naval ships in a laboratory setting
- Developed high-speed, time-resolved, optical measurement techniques in order to measure free-surface shape, sub-surface velocity fields, and air entrainment behavior non-intrusively
- Created novel image processing algorithms to extract quantitative information from high-speed movies
- Utilized a wide range of statistical analysis techniques, such as cross-correlation and spectral methods, to determine flow characteristics from large data sets
- Reported findings on a regular basis in the form of conference presentations and publications as well as annual reports to the Office of Naval Research (ONR)
- Supervised a number of high school, undergraduate, and international exchange students while working on a range of experimental setups

The University of Maryland Multi-Phase Transport Laboratory, College Park, MD

Undergraduate Research Assistant

February 2009 to May 2010

- Supervisor: Dr. Kenneth Kiger
- Studied the suspension of sediment produced during rotorcraft takeoff and landing
- Constructed a variable-speed, single-bladed rotor for use in preliminary benchmark testing
- Designed a novel vertical wind tunnel device capable of generating coherent vortex rings
- Utilized 3-D CAD software to design and integrate components of the overall device structure

- Interfaced with machinists and suppliers to acquire system components
- Constructed and tested wind tunnel device within an acrylic enclosure
- Measured nozzle exit velocities using a pitot tube for flow characterization
- Assisted in setting up Particle Image Velocimetry (PIV) experiments

Terps Racing Formula SAE Team, College Park, MD

Aerodynamics Team Member

June 2009 to May 2010

- Supervisor: Professor Greg Schultz
- Collaborated with an interdisciplinary team of engineers to design and build an open-wheeled Formula-style race car in order to compete internationally against collegiate teams
- Combined inverse design and parametric design methods to create high-lift airfoils that maximized downforce on the vehicle to improve high-speed turning
- Utilized the Stratford method to determine the coefficient of pressure distribution for an airfoil just before separation at each point on its suction side, yielding the highest possible lift
- Used inverse design theory to create airfoils from optimal coefficient of pressure distributions
- Performed two- and three-dimensional Computational Fluid Dynamics (CFD) simulations to evaluate aerodynamic performance under a range of conditions
- Created detailed 3-D CAD models to integrate airfoils with other vehicle body components
- Coordinated with other teams to integrate the design of the aerodynamic package into the overall vehicle design
- Fabricated aerodynamic components using carbon fiber composites
- Competed in a field of 120 cars built by a variety of international universities at Michigan International Speedway
- Achieved a ranking of 4th overall and received a competition-best score in the skid-pad event, which tests high-speed turning

PROFESSIONAL
DEVELOPMENT

- **Interactive Workshop on Crafting a Competitive NSF STEM Education Proposal**, Salt Lake City, UT, June 24, 2018.
- **Integrated e-Learning Modules: Strategies for Deployment and Development of Contextual Activities**, Salt Lake City, UT, June 23, 2018.
- **Building the New Freshman Seminar Workshop**, The Citadel, June 5-7, 2018.
- **Service Learning and Civic Engagement Summer Academy**, The Citadel, May 7-9, 2018.
- **Workshop on Reducing Attrition in Precalculus Pathways to Engineering Degrees (WRAPPED workshop as a part of SC: SUPPORTED program)**. North Charleston, SC, March 20, 2018.
- **NCBI Leadership in Diversity and Respect Workshop**, The Citadel, April 28, 2017.
- **The Citadel's Online Teaching Faculty Academy**. April 17–May 5, 2017.
- **Mini ExCEED Teaching Workshop**. Charleston, SC. January 5–6, 2017
- **2015 Summer Research School on Fluid Dynamics: Topics in Turbulence**. College Park, MD. June 1–5, 2015.
- **Johns Hopkins CEAFM Tomographic PIV and Applications Workshop**. Baltimore, MD. November 19–22, 2013.
- **LaVision Tomographic PIV Workshop**. Baltimore, MD. November 19, 2011.
- **JM Burgerscentrum Course on Particle Image Velocimetry**. Delft, Netherlands. October 24–28, 2011.

GRANTS

KEEN Mini-Grant for Deployment of e-Learning Module “The Elevator Pitch: Advocating for your good ideas” into MECH 481

PUBLICATIONS

Washuta, N. and Bass, P. A Complementary Approach to Implementing Entrepreneurship into a Mechanical Engineering Senior Capstone Course Sequence. *Proceedings of the 2019 ASEE Annual Conference on Engineering Education*, Tampa, FL. June 16–19, 2019.

Howison, J., Rabb, R., Book, E., and Washuta, N. A Simple, Economic Lab for Thermal/Fluids Courses. *Proceedings of the 2019 ASEE Annual Conference on Engineering Education*, Tampa, FL. June 16–19, 2019.

Masnadi, N., Erinin, M. A., Washuta, N., Farshad, N., Balaras, E., and Duncan, J. H. Air Entrainment and Surface Fluctuations in a Turbulent Ship Hull Boundary Layer. *Proceedings of the 32nd Symposium on Naval Hydrodynamics (SNH 018)*, Hamburg, Germany. August 5–10, 2018.

Washuta, N., Howison, J., Clark, B., Imhoff, R., and Dos Reis, L. Water Tunnel Design: A Senior Capstone Project to Promote Hands-on Learning in Fluids. *Proceedings of the 2018 Annual Conference on Engineering Education*, Salt Lake City, UT. June 24–27, 2018.

Rabb, R., Washuta, N., and Floyd, C. Using Mechatronics to Develop Self Learners and Connect the Dots in the Curriculum. *Proceedings of the 2018 ASEE Annual Conference on Engineering Education*, Salt Lake City, UT. June 24–27, 2018.

Ghanat, S., Garner, D., Howison, J., Hunter, R., Swart, B., Banik, S., Verdicchio, M., and Washuta, N. Students’ Perception of a Summer Undergraduate Research Experience: Across the Disciplines. *Proceedings of the 2018 ASEE Annual Conference on Engineering Education*, Salt Lake City, UT. June 24–27, 2018

Bubacz, M., Washuta, N., and Bass, P. A Flipped-Classroom Format Applied to a Software-Based Course. *Proceedings of the 2018 ASEE Southeast Section Annual Conference*, Daytona Beach, FL. March 4–6, 2018.

Bass, P., Washuta, N., Howison, J., Gonzalez, R., and Maier, C. Benefits and Challenges of Undergraduate Research. *Proceedings of the 2018 ASEE Southeast Section Annual Conference*, Daytona Beach, FL. March 4–6, 2018.

Rabb, R., Bubacz, M., Howison, J., Skenes, K., Bass, P., Geathers, J., Book, E., and Washuta, N. Complete ABET Program Assessment (CAPA) for a New Engineering Program. *Proceedings of the 2018 ASEE Southeast Section Annual Conference*, Daytona Beach, FL. March 4–6, 2018.

Bubacz, M., Washuta, N., and Bass, P. A Flipped Classroom Format Applied to a Software-Based Course. *Transactions on Techniques for STEM Education*. Vol 3(2). Pp.96-102, January-September, 2018.

Bass, P., Washuta, N., Tobey, U., and Gonzalez, R. GTOC 9: Results from the Military College of South Carolina and Des Moines Area Community College (team Citadel-DMACC). *Acta Futura*, 11, pp.117-123, January 2018.

Washuta, N. Air Entrainment in the Turbulent Ship Hull Boundary Layer. PhD Dissertation, Department of Mechanical Engineering, The University of Maryland, College Park, MD. 2016.

Washuta, N., Masnadi, N., and Duncan, J. H. Near-Surface Boundary Layer Turbulence Along a Horizontally-Moving, Surface-Piercing Vertical Wall. *31st Symposium on Naval Hydrodynamics (SNH 2016)*, Monterey, California, USA. September 11–16, 2016.

CONFERENCE
PRESENTATIONS

- Washuta, N., Masnadi, N., and Duncan, J. H. The Turbulent Boundary Layer on a Horizontally Moving, Partially Submerged, Surface-Piercing Vertical Wall. *30th Symposium on Naval Hydrodynamics (SNH 2014)*, Hobart, Tasmania, Australia. November 2–7, 2014.
- Washuta, N (presenter). and Bass, P. A Complementary Approach to Implementing Entrepreneurship into a Mechanical Engineering Senior Capstone Course Sequence. *Proceedings of the 2019 ASEE Annual Conference on Engineering Education*, Tampa, FL. June 16–19, 2019.
- Howison, J., Rabb, R., Book, E., and Washuta, N. (presenter). A Simple, Economic Lab for Thermal/Fluids Courses. *Proceedings of the 2019 ASEE Annual Conference on Engineering Education*, Tampa, FL. June 16–19, 2019.
- Rabb, R., Washuta, N. (presenter), and Floyd, C. Using Mechatronics to Develop Self Learners and Connect the Dots in the Curriculum. *Proceedings of the 2018 ASEE Annual Conference on Engineering Education*, Salt Lake City, UT. June 24–27, 2018.
- Ghanat, S., Garner, D., Howison, J., Hunter, R., Swart, B., Banik, S., Verdicchio, M., and Washuta, N. (presenter). Students' Perception of a Summer Undergraduate Research Experience: Across the Disciplines. *Proceedings of the 2018 ASEE Annual Conference on Engineering Education*, Salt Lake City, UT. June 24–27, 2018
- Washuta, N. (presenter), Howison, J., Clark, B., Imhoff, R., and Dos Reis, L. Water Tunnel Design: A Senior Capstone Project to Promote Hands-on Learning in Fluids. *Proceedings of the 2018 Annual Conference on Engineering Education*, Salt Lake City, UT. June 24–27, 2018.
- Washuta, N.(presenter), Masnadi, N., and Duncan, J. H. The Turbulent Boundary Layer Near the Air-Water Interface on a Surface-Piercing Flat Plate. In: *68th Annual Meeting of the American Physical Society Division of Fluid Dynamics (APS-DFD 2015)*, Boston, MA, November 22–24, 2015.
- Washuta, N.(presenter), Masnadi, N., and Duncan, J. H. Water Surface Ripples Generated by the Turbulent Boundary Layer of a Surface-Piercing Moving Wall. In: *67th Annual Meeting of the American Physical Society Division of Fluid Dynamics (APS-DFD 2014)*, San Francisco, CA, November 23–25, 2014.
- Masnadi, N. (presenter), Washuta, N., and Duncan, J. H. Surface Ripples Generated in a Couette Flow with a Free Surface. In: *67th Annual Meeting of the American Physical Society Division of Fluid Dynamics (APS-DFD 2014)*, San Francisco, CA, November 23–25, 2014.
- Washuta, N. (presenter), Masnadi, N., and Duncan, J. H. The Turbulent Boundary Layer on a Horizontally Moving, Partially Submerged, Surface-Piercing Vertical Wall. In: *30th Symposium on Naval Hydrodynamics (SNH 2014)*, Hobart, Tasmania, Australia. November 2–7, 2014.
- Washuta, N. (presenter), Liu, X., Korenowski, G. M., and Duncan, J. H. On the Measurement of Longitudinal Interfacial Waves and Surfactant Dynamic Properties. In: *66th Annual Meeting of the American Physical Society Division of Fluid Dynamics (APS-DFD 2013)*, Pittsburgh, PA, November 24–26, 2013.
- Masnadi, N. (presenter), Washuta, N., Wang, A., and Duncan, J. H. The Interaction of a Turbulent Ship Hull Boundary Layer and a Free Surface. In: *66th Annual Meeting of the American Physical Society Division of Fluid Dynamics (APS-DFD 2013)*, Pittsburgh, PA, November 24–26, 2013.

- Washuta, N. (presenter), Liu, X., Korenowski, G. M., and Duncan, J. H. Measurements of Longitudinal Surface Waves in a Soluble Surfactant Solution. In: *65th Annual Meeting of the American Physical Society Division of Fluid Dynamics (APS-DFD 2012)*, San Diego, CA, November 18–20, 2012.
- CONFERENCE POSTERS Rabb, R., Skenes, K., Washuta, N. (presenter), Chen, M., Hunter, R., Nelson, S., Sheppard, W. Preparation for Calculus at The Citadel. *WRAPPED Workshop*, North Charleston, SC. March 20, 2018.
- Washuta, N. (presenter), Masnadi, N., and Duncan, J. H. The Turbulent Boundary Layer on a Horizontally Moving, Surface-Piercing Vertical Wall. *11th Annual Burgers Program for Fluid Dynamics Symposium*, November 13, 2014.
- PROFESSIONAL MEMBERSHIPS Order of the Engineer, Member, 2018– Present
American Society of Engineering Education, Mechanical Engineering Division - Member At Large, 2018–Present
- AWARDS AND CERTIFICATIONS **Professional Engineer** (ID: 36750)
 - South Carolina Board of Engineers & Surveyors**FE/EIT Exam** (Registration number: 39037)
Dean’s ENME Graduate Fellowship, 2010–2014
Jacob K. Goldhaber Travel Grant, 2014
International Conference Student Support Award, 2014
Best Student Poster Award
 - 11th Annual Burgers Program for Fluid Dynamics Symposium**Lean Six Sigma Certification, Green Belt**
- COMPUTER SKILLS • Matlab, SolidWorks, Pro-Engineer, Creo Parametric, MakerBot Desktop, Tormach CNC Mill Software, Phantom Camera Control Software, DaVis Imaging Software, LaTeX, Fluent, Gambit, Microsoft Office, Adobe Creative Suite, Inkscape, Sketchup