Derek Nichols

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EDUCATION

GEORGIA INSTITUTE OF TECHNOLOGY, ATLANTA, GA — *Expected Graduation*: Winter 2023
Ph.D., M.S., Mechanical Engineering

- Graduate Research Advisor: Dr. Ari Glezer
- Proposed Thesis Title: Characterization and Control of Inlet Nacelle Flow in the Presence of Crosswind and Ground Effects
- Minor Concentrations: Environmental Fluid Mechanics; Teaching in Higher Education

UNIVERSITY OF PITTSBURGH, PITTSBURGH, PA — *Graduation Date*: April 30, 2017
B.S., Mechanical Engineering

- *Summa Cum Laude*
- Minor Degrees: Bioengineering; Mathematics

RESEARCH EXPERIENCE

FLUID MECHANICS RESEARCH LAB (FMRL) — 2017 - Present
Georgia Institute of Technology, Professor Ari Glezer

- Funded by The Boeing Company, Georgia Tech, and the NSF GRFP
- Perform experiments to better understand nacelle separation produced by crosswinds
- Develop new and innovative ways to negate the effects of inlet separation during takeoff and landing
- Decrease inlet flow distortion by up to 60% and 50% at 30 and 35 knots crosswind, respectively
- Investigate the effect of the ground plane and the possible formation of a ground vortex

OSTEOCHONDRAL BIOREACTOR RESEARCH PROJECT — 2014 - 2018
University of Pittsburgh, Dr. Paolo Zunino and Dr. Riccardo Gottardi

- Developed microfluidic bioreactor prototypes used to test drugs for osteoarthritis
- Simulated fluid flow and 3D printed models tested in a laboratory to compare results
- Optimized model to maximize drug exposure to the test cells achieving 2.4x delivery versus original design

JOURNAL PUBLICATIONS

- **Nichols, D.A.,** Sondh, I., Little, S., Zunino, P., and Gottardi R., "Design and validation of an osteochondral bioreactor for the screening of treatments for osteoarthritis," *Biomedical Microdevices,* Vol. 20, No. 18, 2018.

CONFERENCE PAPERS

- **Nichols, D.A.,** Vukasinovic, B., and Glezer, A., "Scaling Characteristics of Ground Vortices in a Nacelle Inlet Flow Field," AIAA Paper 2023-1981, January 2023.
- **Nichols, D.A.,** Vukasinovic, B., Glezer, A., and Rafferty, B., "Formation of a Nacelle Inlet Ground Vortex in Crosswind," AIAA Paper 2022-1698, January 2022.
- **Nichols, D.A.,** Vukasinovic, B., Glezer, A., DeFore, M., and Rafferty, B., "Steady and Unsteady Control of Nacelle Inlet Flow in Crosswind," AIAA Paper 2021-1556, January 2021.
- **Nichols, D.A.,** Vukasinovic, B., Glezer, A., DeFore, M., and Rafferty, B., "Fluidic Control of Nacelle Inlet Flow in Crosswind," AIAA Paper 2020-2955, June 2020.
- **Nichols, D.A.,** Vukasinovic, B., Glezer, A., DeFore, M., Rafferty, B., and Palacios, F., "Characterization and Control of a Nacelle Inlet Flow in Crosswind" AIAA Paper 2019-3685, June 2019.

CONFERENCE PRESENTATIONS

- **Nichols, D.A.,** Vukasinovic, B., and Glezer, A., "Formation and Stability of a Ground Vortex in the Cross Flow over an Axisymmetric Inlet," *75th Annual Meeting of the APS Division of Fluid Dynamics,* November 21, 2022.
- **Nichols, D.A.,** Vukasinovic, B., and Glezer, A., "Vortex Dynamics in Axisymmetric Inlet Over a Plane in a Cross Flow," *74th Annual Meeting of the APS Division of Fluid Dynamics,* November 21, 2021.
- **Nichols, D.A.,** Vukasinovic, B., Glezer, A., DeFore, M., and Rafferty, B., "Adaptable Fluidic Control of Round Inlet Flow in Cross Flow," *73rd Annual Meeting of the APS Division of Fluid Dynamics,* November 22, 2020.
- **Nichols, D.A.,** Vukasinovic, B., Glezer, A., DeFore, M., and Rafferty, B., "Fluidic Control of Round Inlet Flow in a Crosswind," *72nd Annual Meeting of the APS Division of Fluid Dynamics,* November 25, 2019.

PATENT APPLICATIONS

- "Adaptable Flow Control for Engine Nacelles," Rafferty, B., DeFore, M., Glezer, A., Vukasinovic, B., **Nichols, D.A.**, Application No 15,931,328, November 11, 2021.
- "Aerodynamic Flow Control Systems and Methods," Glezer, A., Vukasinovic, B., **Nichols, D.A.**, Application No PCT/US2019/063764, June 4, 2020.

SKILLS

Programming Languages

- Experienced with: MATLAB, HTML, CSS
- Exposure to: Python, C/C++, Assembly, UNIX, Mathematica

Software

- ANSYS, AutoDesk, EES, Excel, Git, LabVIEW, LaVision DaVis, Power Automate, Siemens NX, SolidWorks, Tecplot

Laboratory

- Particle image velocimetry, experimental flow visualization, experimental design, laser and camera optics

TEACHING EXPERIENCE

Thermodynamics Instructor of Record — Spring 2023

- Developed and delivered all course material in conjunction with ASME Graduate Teaching Fellowship

Undergraduate Fluid Mechanics Teaching Associate — Fall 2021

- Average CIOS score of 4.93/5 measuring overall teaching effectiveness

Undergraduate Fluid Mechanics Teaching Associate — Fall 2020

- Average CIOS score of 4.85/5 measuring overall teaching effectiveness

Georgia Tech's Tech to Teaching Certificate — Fall 2020

- Completed three graduate-level courses to prepare future faculty in teaching pedagogy and course design

CIRTL Certificate — Spring 2020

- Center for the Integration of Research, Teaching, and Learning (CIRTL) associate level certificate

Undergraduate Fluid Mechanics Teaching Assistant — Fall 2019

- Average CIOS score of 4.91/5 measuring overall teaching effectiveness

MEMS Senior Design Undergraduate Teaching Assistant — Spring 2017
MEMS Fundamentals of Engineering Projects Undergraduate Teaching Assistant — Spring 2017

LEADERSHIP AND SERVICE

FMRL Lab Manager — 2021 - Present

- Manage lab operations, oversee lab/laser inspections, and schedule preventative maintenance on equipment
- Redesigned and maintain lab website (https://fmrl.gatech.edu)

Woodruff School Graduate Mental Health and Wellness Committee Member — 2021 - Present

- Advocate for graduate student rights and protective policies within the department
- Redesigned and maintain group website (https://sites.gatech.edu/megradmentalhealth)
- Project manager for tool aimed at providing graduate students with resources for conflict resolution

Georgia Tech President's Undergraduate Research Award (PURA) Reviewer — 2019 - Present
Georgia Tech Muay Thai Senior Member - Officer — 2017 - 2020
Georgia Tech NASA Robotic Mining Mechanical Engineering Lead — 2018
Pitt MEMS Senior Design Project Sponsor — Spring 2017
Pitt Makerspace Volunteer — 2015 - 2017
Altoona Public Access Channel Cameraman and Editor — 2010 - 2013

AWARDS & HONORS

ASME Graduate Teaching Fellowship — 2022
Best Paper, Fluid Dynamics, AIAA SciTech 2022 — 2022
National Science Foundation Graduate Research Fellowship Program (NSF GRFP) Fellow — 2019 - Present
AIAA Orville and Wilbur Wright Graduate Award — 2019
Georgia Tech President's Fellowship — 2017 - 2020
Pitt Mobile App Challenge - Finalist — 2017
Best MEMS Senior Design Presentation — 2016
Pitt SSOE Design Expo - 2nd Overall MEMS Design — 2016
Pitt SSOE Design Expo - 2nd Overall ECE Design — 2016
SSOE Summer Research Fellowship — 2016