

# JACOB M. NEAL

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## EDUCATION

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**Rensselaer Polytechnic Institute: Troy, New York**

*August 2018 - Present*

- PhD Aeronautical Engineering, advised by Professor Michael Amitay

**University of Maine: Orono, Maine**

*September 2014 - May 2018*

- B.S. Mechanical Engineering, Magna Cum Laude, Business Administration Minor

## TECHNICAL STRENGTHS

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<b>Hands-on</b>	Experimental Setup and Design, Machine Design
<b>Modeling and Analysis</b>	Matlab, Seimans NX, Solidworks, Paraview
<b>Software &amp; Tools</b>	MS Office, Latex

## WORK EXPERIENCE

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**Center for Flow Physics and Control**

*August 2018 - Present*

*Graduate Researcher*

- **PhD thesis topic:** Flow Control for Drag Minimization on Swept and Tapered Finite Wings

-Experimentally measured the 3D velocity fields resulting from boundary layer separation using Stereo Particle Image Velocimetry and tracked the effect of planform geometry on these flowfields.

-Managed five undergraduate students and two Master of Engineering students who contributed to the project.

-Developed methods for post-processing of 3D flow data including dynamic mode extraction from SPIV snapshots, separation bubble and vortex identification in the wake, and 3D streamline filtering.

-Strong expertise in experimental design for volumetric mean flow measurement using SPIV and surface oil flow visualizations in wind and water tunnel testing regimes.

**Rensselaer Polytechnic Institute**

*August 2020 - December 2021*

*Graduate Teaching Assistant - Flight Mechanics, Fluid Mechanics*

- Assisted in the instruction of aerodynamics, aircraft stability and control, and fundamental fluid statics and dynamics for classes of  $\approx 70$  students. Corrected homeworks and exams, and addressed student questions and concerns during weekly office hours.

**Sandia National Laboratories**

*May 2018 - August 2019*

*R&D Intern - Graduate*

*Summer 2019*

- Computational solid mechanics (FEA), material characterization/ material model development for thermal expansion and heat transfer properties of propriety epoxy used in composite parts. Statistical investigation including uncertainty quantification and sensitivity analysis was performed to rank each material properties effect on the coefficient of thermal expansion of an epoxy cube.

*R&D Intern - Undergraduate*

*Summer 2018*

- Computational solid mechanics (FEA), validation and verification study of carbon fiber epoxy / aluminum parts with curved geometries.

## **Advanced Structures and Composites Center**

December 2016 - May 2018

### *Research Assistant*

- Assisted with design, analysis, and fabrication stages for 1:50 scale model floating offshore wind turbine. Created CAD model for every part in the assembly, created detailed drawing package. Designed and implemented vacuum infusion process for the fabrication of carbon fiber epoxy wind turbine blades using high density foam molds machined in house.

## **University of Maine**

September 2015 - May 2017

### *Instructor's Aide*

- Corrected papers for Statics and Dynamics, tutored students one-on-one, led balsa bridge design/test project.

## **PUBLICATIONS**

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- Neal, J. M., and Amitay, M. "Three-dimensional separation over unswept cantilevered wings at a moderate Reynolds number". *Physical Review Fluids*, 014703(8), 124.(2023).

## **PRESENTATIONS**

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- Ribeiro J., Neal J., Burtsev A., Theofilis V., Taira K., Amitay M., "Wake dynamics of tapered wings Part I: a computational study." AIAA Scitech, National Harbour, MD, 23rd - 27th, Jan. 2023
- Neal J., Gares B., Burtsev A., Ribeiro J., Theofilis V., Taira K., Amitay M., "Wake dynamics of tapered wings Part II: an experimental study." AIAA Scitech, National Harbour, MD, 23rd - 27th, Jan. 2023
- Burtsev A., Neal J., Ribeiro J., Theofilis V., Taira K., Amitay M., "Wake dynamics of tapered wings Part III: a theoretical study." AIAA Scitech, National Harbour, MD, 23rd - 27th, Jan. 2023
- Carvajal T.R., Neal J., Amitay M., "Evaluation of the Modified Version of the Holmn Vortex Identification Method Using Experimental Data" AIAA Scitech, National Harbour, MD, 23rd - 27th, Jan. 2023
- Ribeiro J., Neal J., Burtsev A., Theofilis V., Amitay M., Taira K. "Laminar flow separation over tapered wings, Part 1: a computational study", 75th Meeting of the American Physical Society, Division of Fluid Dynamics, Indianapolis, IN, November 22 2022
- Gares B., Neal J., Burtsev A., Ribeiro J., Theofilis V., Taira K., Amitay M., "Laminar flow separation over tapered wings, Part 2: an experimental study", 75th Meeting of the American Physical Society, Division of Fluid Dynamics, Indianapolis, IN, November 22 2022
- Burtsev A., Ribeiro J., Neal J., Taira K., Amitay M., Theofilis V. "Laminar flow separation over tapered wings, Part 3: a theoretical study", 75th Meeting of the American Physical Society, Division of Fluid Dynamics, Indianapolis, IN, November 22 2022
- Neal J., Amitay M. "Experimental investigation of 3-D separation over swept and tapered wings at a moderate Reynolds number", 75th Meeting of the American Physical Society, Division of Fluid Dynamics, Indianapolis, IN, November 22 2022
- Neal J. and Amitay, M., "Three-Dimensional Flowfield Measurements of a Swept-back Cantilevered Wing at High Angles of Attack." AIAA Scitech, San Diego, CA, 3rd - 7th, Jan. 2022
- Neal, J., Ottinger, J., Hayostek, S., and Amitay, M., "Experimental Investigation on the Effect of Sweep and Taper on Low Reynolds Number Finite Wings." AIAA Scitech, San Diego, CA, 3rd - 7th, Jan. 2022

- Neal, J., Ottinger, J., Gares, B., and Amitay, M., “Three Dimensional Flowfield over Swept and Tapered Finite Span Wings at a Low Reynolds Number.” The 61st Israel Annual Conference on Aerospace Sciences held in Shefayim Haifa, Israel, March 9-10, 2022.
- Neal, J. and Amitay, M., “Three-Dimensional Separation Over Low Aspect Ratio Cantilevered Wings.” AIAA-2021-1212, SciTech, Virtual event, 11-15; 19-21, January 2021
- Neal J., Amitay M. “Three-dimensional separation over a finite-span NACA 0015 airfoil”, 72nd Meeting of the American Physical Society, Division of Fluid Dynamics, Seattle, WA, November 23 2019
- Neal J. Sensitivity Analysis of Glass-Fiber Reinforced Plastic Material Properties, Poster Presentation, Sandia National Laboratories, August 2019

## LEADERSHIP AND OUTREACH

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### **Pi Tau Sigma Chapter President**

August 2017 -May 2018

- Established marketing committee to increase enrollment, sent member to national PTS conference for the first time in years, facilitated weekly tutoring sessions for students in first and second year mechanical engineering courses

### **Lead Resident Assistant**

November 2015 - May 2018

- Led a team of 15 RAs to enforce University housing policies across three residence halls of approximately 250 students each, promoted a comfortable atmosphere for all residents, collaborate with various departments on campus to increase student awareness of avenues towards a healthy lifestyle.

### **Black Bear Mentor**

August 2016 -May 2018

- Served as a positive role model for local elementary children from challenging family dynamics. Encouraged critical thinking and STEM education.

### **Residence Hall Association President**

August 2017 -May 2018

- Designed and implemented strategy to increase resident participation in on-campus events, attended regional residence hall leadership conferences