

Joshua ANIBAL

Aerospace Engineering and Scientific Computing Ph.D. Candidate

🇺🇸 U.S. Citizen

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≡ GOAL AND SUMMARY

I am an aerospace engineer with a passion for high-performance computing (HPC) **looking for a postdoctoral position in scientific computing for spring 2023.**

My research has focused on gradient-based shape optimization for conjugate heat transfer problems using computational fluid dynamics (CFD) and finite element methods. I am also interested in nonlinear and linear solvers, optimizing CFD code for HPC processor architectures, and numerical stability analysis of CFD. In addition to the requirements of an aerospace engineering Ph.D., I have taken six additional courses on the methods and applications of scientific computing, including numerical linear algebra and parallel computing, to fulfill the requirements for a scientific computing degree specialization. On top of a theoretical scientific computing background, I also have extensive experience with modern software development tools such as docker/singularity, automatic testing, and code review.

🎓 EDUCATION

2018-Present	Ph.D. Aerospace Engineering and Scientific Computing University of Michigan GPA:3.98 Honors & Awards: Dwight F. Benton fellow, Rackham Outstanding Graduate Student Instructor Award Notable Classes: CFD II, Numerical Linear Algebra, Parallel Programming, and Machine Learning for Science
2014-2018	B.S.E. Aerospace Engineering University of Michigan GPA:3.89 Honors & Awards: Dean's List, University Honors, The Boeing Company Scholarship Recipient Notable Classes: CFD I, Computational Data Science, Aerodynamics, Multidisciplinary Design Optimization

📁 EXPERIENCE

Summer 2016 - Present	Research Assistant Multidisciplinary Design Optimization (MDO) Laboratory <ul style="list-style-type: none">➢ Added convective heat transfer computation and associated derivatives to in house CFD solver with new tests to verify the correctness of the implementation and derivatives.➢ Collaborated with researchers at NASA and other Universities to create a framework for multi-physics high-fidelity optimization, MPhys.➢ Developed tools to automatically build Docker and Singularity containers to easily run our lab software stack on HPC systems in a reproducible way.➢ Developed coupled optimization of airfoil shape with and without high-lift mechanisms deployed using overset CFD analysis in order to increase commercial aircraft efficiency.
Fall 2019, Fall 2020	Graduate Student Instructor Aircraft Design Course <ul style="list-style-type: none">➢ Presented six lectures (three in-person and three remotely), which I had redesigned to incorporate active learning techniques to better engage students during class.➢ Worked with the course instructor to devise a project idea for the course that was related to real world trends in the commercial aircraft industry.➢ Graded and provided feedback on all assignments, presentations, and projects and returned them in a timely manner.
Summer 2017	Conceptual Design/ Aerodynamics Intern Lockheed Martin, Palmdale (The Skunk Works) <ul style="list-style-type: none">➢ Enhanced existing aerodynamic analysis tool by incorporating conceptual drag buildup methods to provide a quick estimate of total drag➢ Automated CFD post-processing procedure to produce flow field visualization for over 100 design configurations.
Fall 2016 - Spring 2018	Team Captain MACH Michigan AIAA-Design Build Fly Chapter <ul style="list-style-type: none">➢ Founded team of approximately 15 students to compete in AIAA's Design Build Fly competition to provide engineering experience to students, and represent the university on a national level➢ Composed a budget and presented it to the aerospace department chair to secure funding➢ Organized a collaborative effort with another student project team, M-Fly, to produce Multidisciplinary Design Optimization (MDO) programs for conceptual aircraft design.

COMPUTER SKILLS

Python	● ● ● ● ●	Use: Daily For: Course Work, Research
Fortran	● ● ● ● ○	Use: Often For: Course Work, Research
C++	● ● ● ○ ○	Use: Occasionally For: Course Work, Research
Linux	● ● ● ○ ○	Use: Daily For: Personal, Research
Git	● ● ● ○ ○	Use: Daily For: Personal, Research
GitHub	● ● ● ○ ○	Use: Daily For: Personal, Research
Latex	● ● ● ○ ○	Use: Often For: Personal, Research
Matlab	● ● ● ○ ○	Use: Often For: Course Work
Solidworks	● ● ● ○ ○	Use: Occasionally For: Student Project Teams
C#	● ● ○ ○ ○	Use: Rarely For: Internship

PUBLICATIONS

Journal Articles

- **Flexible Formulation of Spatial Integration Constraints in Aerodynamic Shape Optimization**
B. J. Brelje, **J. L. Anibal**, A. Yildirim, C. A. Mader, and J. R. R. A. Martins
AIAA Journal, 2020 , doi:10.2514/1.j058366
- **Aerodynamic shape optimization of an electric aircraft motor surface heat exchanger with conjugate heat transfer constraint**
J. L. Anibal, C. A. Mader, and J. R. R. A. Martins
International Journal of Heat and Mass Transfer, 2022 , doi:10.1016/j.ijheatmasstransfer.2022.122689
- **MPhys: A Modular Multiphysics Simulation Library Using the OpenMDAO Framework**
A. Yildirim, K. E. Jacobson, **J. L. Anibal**, B. K. Stanford, C. A. Mader, J. S. Gray, J. R. R. A. Martins, and G. J. Kennedy
In preparation

Conference Papers and Presentations

- **Aerothermal Optimization of X-57 High-Lift Motor Nacelle**
J. L. Anibal, C. A. Mader, and J. R. R. A. Martins
AIAA Scitech 2020 Forum, 2020 , doi:10.2514/6.2020-2115
- **High-fidelity Optimization in OpenMDAO**
J. L. Anibal, and J. R. R. A. Martins
AIAA Aviation 2021 Forum, 2021 , *presentation only*

PROJETS

DGFLOW

WINTER 2019

 github.com/joanibal/DGflow

A Discontinuous Galerkin (DG) solver for the Euler equations developed for CFD II class. It features support for curved high order elements and has an adjoint (finite difference Jacobin) builtin for derivatives

Fortran Python

SERVICE

Summer 2018	Teaching Assistant MSteam summer academy <ul style="list-style-type: none">➤ Worked with students from underrepresented backgrounds to help prepare them for their first year at the University of Michigan.➤ I assisted in the Intro to Engineering lectures and helped students with homework during study hall.
Winter 2020 - Present	Committee member Aerospace GSAC Diversity, Equity and Inclusion (DEI) sub-committee <ul style="list-style-type: none">➤ Worked with other Graduate student advise the department on DEI and to organize DEI events.
Winter 2020	Guest Lecturer Davis Aerospace High School <ul style="list-style-type: none">➤ Taught the students of a Detroit high school about Algorithms to encourage participation in STEM.
Fall 2020, Fall 2021	Mentor GSAC incoming student mentorship program <ul style="list-style-type: none">➤ Advised new students in the department to help them navigate their first year of grad school.