Tyler Souders
www.linkedin.com/in/tsouders

Email : tsouders@asu.edu
Mobile : (651) 829-0759

Education

- **University of Colorado Boulder** — Boulder, Colorado
  Ph.D. Mechanical Engineering; GPA: NA/4.00 — *August 2021 - May 2026*
- **Arizona State University** — Tempe, Arizona
  M.S. Mechanical Engineering; GPA: 3.83/4.00 — *August 2019 - May 2021*
- **Arizona State University** — Tempe, Arizona
  B.S.E. Aerospace Engineering; GPA: 3.70/4.00 — *August 2016 - May 2020*

Technical Skills

- **Design and Applications**: Autodesk Revit, AutoCAD, ANSYS FEA, ANSYS Fluent CFD, SOLIDWORKS, Vortex-Lattice CFD, Microsoft Visual Studio
- **Programming**: MATLAB, Python, FORTRAN, Visual Basic for Applications (VBA)
- **Standards**: ASHRAE Guidelines, 14 CFR Parts 25, 91, 121, MIL-HDBK-5J
- **Other**: Microsoft Office Suite, Bluebeam Revu, LaTeX, ModelCenter

Publications

- **Souders, T.J. and Takahashi, T.T., "VORLAX 2020: Making a Potential Flow Solver Great Again"** AIAA AVIATION 2021 Conference, Washington, D.C., June 2021
- **Souders, T.J. and Takahashi, T.T., "VORLAX 2020: Benchmarking Examples of a Modernized Potential Flow Solver"** AIAA AVIATION 2021 Conference, Washington, D.C., June 2021

Research

- **Modernization of a Vortex Lattice Method with Aircraft Design Applications** — Tempe, Arizona
  M.S. Thesis, Under Supervision of Dr. Timothy Takahashi, Dr. Marcus Herrmann — *May 2020 - Present*
  - Improve Vortex-Lattice Method code written in FORTRAN 66 by updating to follow modern computing practices involving in-memory solving routines and operation, resulting in 89% computational run time decrease
  - Utilize Intel Math Kernel Library and self-written iterative Krylov Subspace solvers to identify the most efficient and most versatile solving methods for a dense system of equations
  - Document code performance in usage cases and develop an optimal workflow for the aerodynamic design and analysis of aircraft
- **Numerical Characterization of Pseudoshock Oscillatory Behavior** — Tempe, Arizona
  Fulton Undergraduate Research Initiative, Under Supervision of Dr. Jeonglae Kim — *May 2019 - May 2020*
  - Configure ANSYS Fluent to simulate transient flow behavior in the isolator portion of a scramjet engine in order to characterize shock train response to backpressure fluctuations induced by the combustion process
  - Employ correct turbulence schemes to properly capture wall-proximity behavior due to boundary layer shock interactions

Teaching and Mentorship Roles

- **Lead Aerospace Engineering Tutor - FSE Tutoring Centers** — Tempe, Arizona
  Lead Tutor of the Month, October 2019 — *August 2018 - Present*
  - Provide individualized academic support to hundreds of students in the Fulton Schools of Engineering via strong written and verbal communication skills along with exceptional content comprehension
  - Write and present content development training curriculum to aid other tutors in maintaining their understanding of core course competencies
  - Create and maintain backup tutor management system in Google Sheets to keep centers operating when the primary system fails

- **Graduate Course Grader - AEE 344: Fundamentals of Aircraft Design** — Tempe, Arizona
  Dr. Timothy Takahashi — *Spring 2021*

- **Graduate Course Grader - AEE 463 / MAE 563: Aircraft Propulsion** — Tempe, Arizona
  Dr. Werner J.A. Dahm — *Fall 2020*

- **Graduate Course Grader - MAE 564: Advanced Aerodynamics** — Tempe, Arizona
  Dr. Timothy Takahashi — *Fall 2020, Spring 2021*

- **Graduate Course Grader - AEE 468: Advanced Aerodynamics** — Tempe, Arizona
  Dr. Timothy Takahashi — *Fall 2020, Spring 2021*

- **Undergraduate Teaching Assistant - AEE 344: Fundamentals of Aircraft Design** — Tempe, Arizona
  Dr. Timothy Takahashi — *Spring 2020*

- **Course Grader - MAE 215: Intro to Programming in MATLAB** — Tempe, Arizona
  Dr. Abhinav Kshitij — *Fall 2019*

- **Undergraduate Teaching Assistant - FSE 104: EPICS** — Tempe, Arizona
  Dr. Jared Schoepf — *Spring 2019*

Relevant Course Projects

- **AEE 468 - Aircraft Systems Design - Dr. Timothy Takahashi** - Advanced Aerodynamic Design with Integration Considerations - Spring 2020
  - Utilized VBA and VORLAX to create a tool allowing for high-fidelity first-order designs of a main lifting surface for elliptical (near-ideal) loading, as proposed for usage in the design of the capstone aircraft. The design had to incorporate room for structural elements, fuel storage, embedded engines, and landing gear storage. Wing sweep, station incidence, station camber, and station thickness were varied in order to optimize the shock formation on the wing to maximize leading-edge suction performance benefits while avoiding adverse drag-divergence for the prescribed cruising condition.
- **MAE 561 - Computational Fluid Dynamics - Dr. Marcus Herrmann** - Computational Analysis of a Proposed Mixing Chamber Design - Spring 2020
  - Wrote and deployed a MATLAB code utilzing a 128x128 grid in order to resolve the performance figures of a proposed mixing chamber design. Two-dimensional Navier-Stokes equations and continuity conditions governed the internal flow behavior in the chamber. The code utilized an Adams-Bashforth and Crank Nicolson method to solve the momentum portion of the equations, withe a WENO5-TVD-RK-3 and Crank Nicolson solver to obtain the mass fraction figures for the design. Final results delievered time-dependent velocity magnitudes, mass mixing fractions, and kinetic energy distributions for $Re = 40$ and $Re = 100$
- **MAE 563 - Aircraft Propulsion - Dr. Werner J.A. Dahm** - Parametric Analysis of Ramjet Performance - Fall 2019
  - Used VBA and MATLAB to rigorously analyze performance aspects of a ramjet propulsion system and present findings in a neat and professional format, complete with graphics and meaningful commentary. Numerous flight Mach numbers, altitudes, and component efficiencies were tested for efficacy using a self-written first-order Brayton Cycle analysis code. Results showed negative efficiency impacts from transonic confined flows in the combustor, but postive effects from high freestream Mach numbers, high altitudes, and high total temperature limits in the combustor.

Professional Experience

- **SmithGroup** — Phoenix, Arizona
  Mechanical Engineering Intern — *May 2019 - August 2019*
  - Designed and analyzed performance of commercial heating and ventilation (HVAC) systems, working alongside architects and engineers in an incredibly interdisciplinary environment
  - Utilized Autodesk Revit to create detailed drawings of duct and refrigerant layout schemes. Designed in accordance with legal requirements and ASHRAE guidelines
  - Utilized AutoCAD to review vendor-supplied drawings and import into AutoDesk Revit

Other Work Experience and Involvement

- **Member at Large - American Institute of Aeronautics and Astronautics @ ASU - 50 Members** May 2019 - Present
- **Vice President - Fulton Ambassadors - 162 Members** January 2017 - Spring 2020
- **Logistics Director - Society of Women Engineers - 300 Members** August 2019 - May 2020