ANDREW BODLING

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SUMMARY OF QUALIFICATIONS

- Rotorcraft & HPC CFD specialist with 10+ years developing and applying high-fidelity solvers for DoD and industry
- Architect & lead developer of a performance-portable overset structured curvilinear compressible flow near-body solver now being integrated into CREATE-AV Helios
- Expert in modern C++ (17/20), Fortran, Python, MPI, OpenMP, CUDA, Pybind11, Linux HPC tools
- Published researcher & award-winning developer: 6 journal papers on rotor wake aerodynamics, aeroacoustics, and CFD methodology; VFS Schroers Award for advances in GPU CFD solver development; led high-fidelity, six-degree-of-freedom CFD store-separation simulations on the Apache
- Breadth of delivered software: GPU-accelerated Helios near-body solver, massively parallel (OpenMP/MPI) enhancements to AFRL's FDL3DI LES solver, and FAA-oriented SMART fracture-risk tool—demonstrating impact across aerodynamics, HPC, and structural-safety domains

EDUCATION

Iowa State University (ISU)
Doctor of Philosophy in Aerospace Engineering, Cumulative GPA: 3.75 Degree Obtained: Aug 2019
Thesis Title: Numerical Investigations of Nearly Silent Blade Designs Inspired by the Owl

Iowa State University (ISU)
Master of Science in Aerospace Engineering, Cumulative GPA: 3.75 Degree Obtained: May 2017

The University of Texas at San Antonio (UTSA)
Bachelor of Science in Mechanical Engineering Degree Obtained: December 2013
Cumulative GPA: 3.88, College of Engineering Class Rank: 8 out of 140

WORK EXPERIENCE

CFD Developer – Army Comp. Aeromechanics Lab – NASA Ames, Moffett Field, CA Jun '19 – Present

- Architect & lead developer of a performance-portable overset structured curvilinear compressible flow near-body solver—2 × faster than other well-known GPU flow solvers (134 M cells/s throughput) — now being integrated into CREATE-AV Helios
- Integrated GPU-accelerated OVERFLOW into the Helios framework, including Pybind11-based bindings and new GPU-enabled Fortran modules to support zero-copy near-body CFD on GPUs
- Automated end-to-end OVERFLOW mesh & input generation in Helios, cutting analyst setup time 95%
- Implemented high-order filtering scheme into Cart-p, which proved superior to current AD scheme
- Led high-fidelity CFD simulations of six-degree-of-freedom store separation for the Apache helicopter
- Led rotor-wake accuracy campaign: identified sources of numerical error influencing the prediction of the rotor wake vortex system, and achieved unprecedented CFD agreement with stereo-PIV measurements
- Built and automated the CFD framework (Helios + scripted inputs) for V-22 tiltrotor ↔ ship-deck simulations, validating rotor loads/air-frame download to ≈ 5 % of flight-test data while cutting compute cost 83 % (6 × speed-up)
- Delivered high-fidelity CFD predictions for Sikorsky's FARA competitive-prototype that matched wind-tunnel data within test uncertainty, informing design decisions

Research Scientist – AFRL Computational Sciences Center – Dayton, OH *July '18 – Jun '19*

- Integrated Mean-Flow Perturbation (MFP) analysis into FDL3DI, enabling fast, embedded linear-stability studies of complex 3-D flows
- Applied MFP to a $Re = 2 \times 10^5$, AR 4 wingtip vortex, isolating the least-stable mode and frequency at the trailing-edge and within the incipient vortex core—results now guide actuator placement, frequency, and spatial modulation for future flow-control devices

Graduate RA – Comp. Aerodynamics & Aeroacoustics Lab – Ames, IA *Jan '16 – May '19*

- Extended FDL3DI to handle 90° corners via automated stair-step edge detection and adaptive filter order, enabling accurate LES on complex geometries

- Re-engineered OpenMP load balancing, cutting simulation wall-clock time by 55 % on a 2 K-core cluster
- Validated Ffowcs Williams-Hawkings solver & applied it to trailing-edge noise-reduction designs
- Pioneered wall-resolved LES of airfoils with finlet fences inspired by owl down feathers—demonstrating validated reductions in surface-pressure unsteadiness and far-field noise (greater for taller fences) via increased boundary-layer source–scatter-edge separation

CFD Application Engineer Intern – Exa Corporation – Burlington, MA *July. '15 – Jan. '16*

- Prepared watertight heavy-vehicle meshes (ANSA & PowerDELTA) and ran parametric PowerFLOW CFD studies across design variants, delivering data-driven drag-trade guidance to customers
- Performed PowerFLOW simulations to optimize commercial-bus cabin airflow and built VB/Python scripts to auto-generate CFD result presentations—cutting report prep from days to hours

Graduate RA – Exp. Aero. Lab & Undergrad. RA– Comp. Reliability Lab Sep '12 – May '15

- PIV studies & implemented memory-less Latin Hypercube Sampling in the FAA's SMART tool

AWARDS AND ACTIVITIES (details on LinkedIn)

- Vertical Flight Society Schroers Award for Outstanding Research — August 2024
- NASA Iowa Space Grant Consortium Fellowship of *$12K* total — 2014 – 2015, 2016 – 2018
- Wind Energy Science, Engineering, and Policy Fellowship of *$30K/year* — 2016 – 2018
- Research & Teaching Excellence Award from ISU — Fall 2014, Spring 2019
- Science and Technology Corporation Lead for Code YA — 2023 – 2025
- Multiple ISU & UTSA academic scholarships, $32K total — 2010 – 2015

TECHNICAL SKILLS

Languages & Parallel APIs: C++, Fortran, Python, MATLAB, Bash | CUDA, MPI, OpenMP, Kokkos, Raja

CFD Solvers: Helios native solvers, OVERFLOW, FUN3D, FDL3DI, kCFD, PowerFLOW, Ansys

Meshing & Pre/post-processing: Pointwise, ANSA, PowerDELTA, SolidWorks, Tecplot, FieldView

HPC, Workflow & Profiling: PBS/Slurm, CMake, Git, SVN, VS Code, Nsight Compute/Systems, Pybind11

Coursework: Data Structures & Algorithms, Linear Algebra, Intro to Machine Learning, CFD I & II, HPC, Numerical Methods, Turbulence, Aeroacoustics, Compressible./Incompressible Flow Aerodynamics, FEA

JOURNAL PUBLICATIONS (full publication list available on LinkedIn or by request)

1. **Bodling, A**., Schwarz, C., Wolf, C.C., & Gardner, A.D. (2024). Enhancing Numerical Accuracy in the Prediction of Rotor Wake Vortex Structures*. Physics of Fluids, 36*(3), 037137.

2. **Bodling, A.**, Sharma A. (2019). Numerical Investigation of Noise Reduction Mechanisms in a Bio-Inspired Airfoil*. Journal of Sound and Vibration, 453, 314-327*

3. **Bodling, A.**, Sharma A. (2018). Numerical Investigation of Low-Noise Airfoils Inspired by the Down Coat of Owls*. Bioinspiration & Biomimetics, 14*(1). *(Featured article).*

CONFERENCE PAPERS (full publication list available on LinkedIn or by request)

1. **Bodling, A**., Zagaris, G., Jude, D., Sitaraman, J., & Hosseinverdi, S. (2024). Development of a performance portable compressible flow solver on structured curvilinear grids*. AIAA Aviation 2024 Forum*, Las Vegas, NV, USA, July 29–August 2.

2. Zagaris, G., Holst, K., Sitaraman, J., Hosseinverdi, S., Tyson, W., Lakshminarayan, V. & **Bodling, A**., et al. (2025). Mint: A performance portable mesh data model enabling the development of next-generation massively parallel multi-physics applications*. AIAA SciTech 2025 Forum*, Orlando, FL, USA, Jan 6-10.

3. Moushegian, A., Farish, D., Hayden, E., & **Bodling, A.** (2025). Investigation of modeling approaches to high-fidelity computational predictions of tiltrotor / obstacle aerodynamic interactions. *The Vertical Flight Society's 81st Annual Forum & Technology Display*, Montreal, Quebec, Canada, May 7–9.

4. Sharma, K., Bowles, P., Bunting, C., Dziuba, D., Gruber, K., Klimchenko, V., Lorber, P., Tuozzo, N., Wake, B., & **Bodling, A**. (2024). Comparison of experimental and CFD results for RAIDER X competitive prototype 1/9th scale model. *The Vertical Flight Society's 80th Annual Forum & Technology Display*, Montreal, Quebec, Canada, May 7–9.