ANUSHKA SUBEDI

imnusku@asu.edu | in | | +1-480-318-0620

SUMMARY

Ph.D. candidate specializing in computational fluid dynamics (CFD), multiphysics modeling, and high-performance computing with experience developing validated simulation frameworks and automated design studies. Seeking to apply advanced computational methods to fluid systems.

EDUCATION

Arizona State University, Tempe, AZ, USA 01/2023 – 05/2027 (Anticipated)
Ph.D. Mechanical Engineering, GPA: 4.0/4.0
Research Focus: CFD, Turbulent Transport, Multiphysics Modeling, High Performance Computing.

Arizona State University, Tempe, AZ, USA 01/2023 – 12/2025
Master of Science Mechanical Engineering, GPA: 4.0/4.0

RELEVANT EXPERIENCE

Arizona State University 01/2023 – Present
Ph.D. Researcher developing high-fidelity computational frameworks for fluid systems:

- Developed and validated large-scale DNS models ($\mathcal{O}(10^7)$ DOF) in GPU accelerated codes Nek5000/RS to study turbulent flow control, achieving up to 12% drag reduction through physics-informed wall-based strategies [3].
- Designed a novel frequency-tuned wall transpiration control method by targeting dominant turbulent structures identified through spectral and modal analysis, achieving up to 9% drag reduction [2].
- Studied separated flow physics on a backward-facing step using frequency analysis, and modal decomposition to get the frequencies for flow control using meta-materials; validated with experimental collaboration [1].
- Conducted mesh refinement and sensitivity analyses on MPI-parallel simulations across NSF HPC clusters, Stampede 3, and ASU SOL ($\mathcal{O}(10^3)$ cores), ensuring numerical accuracy and reproducibility.
- Built automated Python pipelines for parametric simulations and developed CNN-based surrogate models for wall-pressure prediction to enable accelerated analysis and design exploration.

IOE, Tribhuvan University 11/2021 – 10/2022
Teaching Assistant

- Assisted ME 431: Engineering Drawings I; taught CAD modeling and technical drafting labs.
- Assisted SH 601: Numerical Methods; led computational labs using C and Python.

Nepal Electricity Authority Engineering Company 05/2021 – 08/2021
Mechanical Engineering Intern

- Supported feasibility study of a 480 MW hydropower plant by designing hydro-mechanical components.
- Developed plant layouts integrating turbines, generators, and thermal systems within facility constraints.
- Produced CAD models and drawings (AutoCAD/SolidWorks) in collaboration with multidisciplinary teams.

SKILLS

CFD & Computational Modeling: Finite Difference/Volume/Element, and Spectral methods, DNS, LES, RANS, multiphase flows, turbulence modeling, mesh generation & independence studies, verification & validation (V&V).
Multiphysics: Coupled momentum, heat, and mass transfer; reduced-order modeling; fluid-structure interaction.
Programming: Python, MATLAB, C, C++, FORTRAN; MPI/OpenMP; Linux/Unix systems.
Software: Nek5000/RS, OpenFOAM, ANSYS Fluent, STAR-CCM+, COMSOL, ParaView, SolidWorks, AutoCAD.

SELECTED PUBLICATIONS

[1] **A. Subedi**, and Y. Peet. *Separated Flow Physics Using Frequency Analysis and Modal Decomposition.* TSFP, 2026.
[2] **A. Subedi**, and Y. Peet. *Frequency-Tuned Approaches to Wall Transpiration Control.* AIAA SciTech Forum, 2025.
[3] **A. Subedi**, and Y. Peet. *Turbulent Flow Control using Wall Sensing.* AIAA Aviation Forum and Ascend, 2024.
[4] A. Pandey, **A. Subedi**, et. al. *Modal Decomposition of Flow During Dynamic Stall using POD.* AIAA SciTech, 2025.
Full list on Google Scholar.

COURSEWORKS & ACTIVITIES

Courseworks: Fluid Mechanics, Thermodynamics, Heat Transfer, Turbulence, Computational Fluid Dynamics, HPC, PDEs, Spectral Element Methods, Multiphase Flows, Linear Algebra, Machine Learning.
Awards: Experiential Learning Grant; GPSA Travel Grant; Graduate College Travel Grant. 2024 and 2026
Affiliations: Member of AIAA and American Physical Society DFD. 2024 – Present