Applied Mathematics & CFD

Research Statement: Applied Mathematics & Computational Fluid Dynamics

My research focuses on the development of mathematically consistent, stable, and high■fidelity simulation methods for turbulent flows. I work on Continuous Eddy Simulation (CES), hybrid RANS–LES approaches, and minimal■error modeling strategies that bridge gaps between traditional turbulence modeling and high■resolution numerical simulation.

My contributions include:

• Continuous Eddy Simulation (CES) formulations enabling smooth transitions between modeled and resolved turbulence.

• Methods designed for stability and reliability at extremely high Reynolds numbers.

• Applications to aerospace configurations including wall-bounded flows, pressure■induced separation, and turbulence–geometry interactions.

• Coupling mesoscale–microscale models for wind■energy forecasting and optimization.

• High■performance computing workflows using OpenFOAM and custom turbulence pipeline automation.

My long■term goal is to advance simulation strategies that make high■fidelity turbulence modeling scalable, efficient, and robust for engineering applications.