

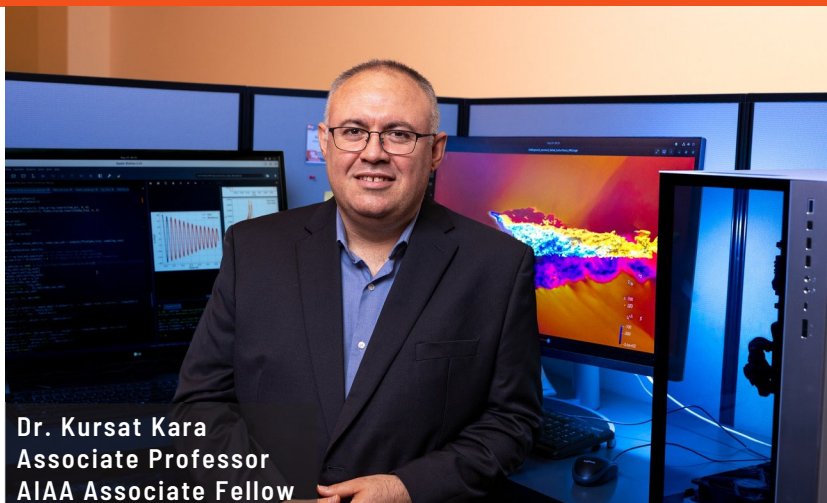


Kara Lab

Kara Aerodynamics Research Laboratory

NOW RECRUITING M.S. & PH.D. STUDENTS

Computational aerodynamics research at the intersection of high-fidelity simulation, turbulent flows, flight dynamics, artificial intelligence, and quantum computing.



Dr. Kursat Kara
Associate Professor
AIAA Associate Fellow

RESEARCH AREAS

Computational Aerodynamics | Large-Eddy Simulation (LES) | Turbulent Flow & Aircraft Interaction
Advanced Air Mobility | Flight Dynamics | Artificial Intelligence | Scientific Machine Learning | Quantum Computing

FEATURED RESEARCH PROGRAMS

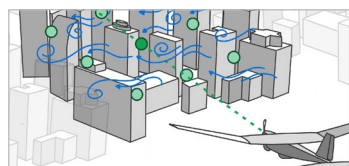
Turbulent
Environments

High-Fidelity
CFD

Aircraft Response &
Flight Dynamics

Scientific ML &
Reduced-Order Models

Autonomy ·
Real-Time Inference



Urban gust environment for AAM operations

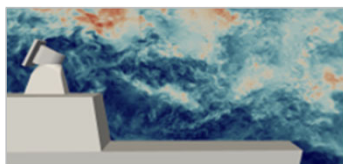
A94 — Effect of Turbulence on Aircraft Structural Loading of AAM VTOL Vehicles

Developing validated urban turbulence and gust models to quantify loading of AAM VTOL aircraft and support assessment of FAA Part 23/27 certification criteria.

Urban Turbulence · LES · Wind-Tunnel Validation · UQ · Gust Loads



U.S. NAVY
Naval Air Warfare Center
Aircraft Division (NAWCAD)



Ship airwake at a wind-over-deck condition

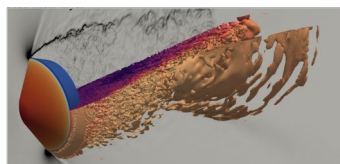
AIRWISE — Artificial Intelligence for Real-Time Wake Inference in Ship Environments

Combining GPU-native large-eddy simulation and data-driven modeling to characterize and infer complex ship airwakes for aircraft operations in maritime environments.

Ship Airwakes · LES · Reduced-Order Modeling · Real-Time Inference · GPU



NASA
Early Stage Innovations (ESI)
Space Technology Research Grants



LES of a re-entry capsule

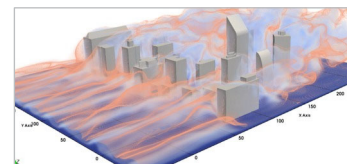
Physics-Guided Multifidelity Learning for Characterization of Blunt-Body Dynamic Stability

Integrating high-fidelity CFD, flight dynamics, and physics-guided multifidelity learning to characterize nonlinear dynamic stability of atmospheric-entry vehicles.

Re-entry Aerodynamics · Dynamic Stability · Multifidelity Learning · SciML



NSF
National Robotics Initiative



LES of the urban wind field over a city model

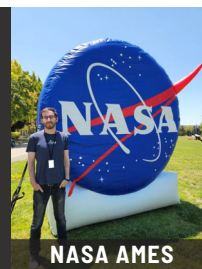
Safe Wind-Aware Navigation for Collaborative Autonomous Aircraft in Low-Altitude Airspace

Developed wind-aware modeling, navigation, and autonomy methods for aircraft operating in turbulent low-altitude urban environments.

Urban Turbulence · Wind-Aware Navigation · Flight Dynamics

Kara Lab Students Beyond OSU

- **NASA Ames** Internships · F. Oz (2023), A. Kassem (2024) and S. Romeo (2024)
- **Los Alamos National Laboratory** Internship · R. Vuppala (2023)
- **Advanced HPC training** · The International HPC Summer School (2023)
- **NASA Langley and NASA Ames** · Students presented at NASA ESI seminars
- **Honors** · CEAT Dean's Outstanding Graduate Student — A. Kassem (2026)



NASA AMES



NASA LANGLEY



NASA ESI TEAM

Present Your Research

AIAA SciTech Forum

AIAA AVIATION Forum

APS Division of Fluid Dynamics

Where Kara Lab Alumni Go

Oak Ridge National Laboratory

Fujitsu Research

SpaceX

Join Kara Lab

Email your CV and a few sentences about your research interests and preferred start term.

Dr. Kursat Kara
kursat.kara@okstate.edu



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