Aerodynamics & Fluid Mechanics

The School of Aerospace Engineering at Georgia Tech is committed to advancing the field of aerodynamics and fluid mechanics as a means of developing highly capable, efficient, and safe aircraft, launch and reentry vehicles, rotorcraft, novel UAV configurations, and wind energy systems.

Aerodynamics and fluid mechanics focus on fluid flow around and within aircraft, rotorcraft, planetary entry vehicles, engines and other complex systems. The School conducts fundamental studies of flow physics and employs advanced computational and experimental techniques and facilities to extend the understanding and capabilities of many essential aerospace applications.

The School has a strong experimental research program in aeroacoustics, vortex dominated flows, and low speed applications; a strong computational fluid dynamics (CFD) research program in fixed- and rotary-wing applications from incompressible through hypersonic speed regimes; and a strong research program in turbulence and turbulent combustion.

Aerospace engineering students and faculty are conducing aerodynamics and fluid mechanics in several areas, including integration of CFD in aircraft, UAV and spacecraft design. This work relies on unstructured, Cartesian and gridless methodologies for complex geometry definition and analysis. Efficient utilization of CFD in formal design methodologies that include gradient and non-gradient based optimizers, adjoint methods, and Response Surface Methods is investigated.

Experimental and computational investigation of rotorcraft and wind energy flow physics is another crucial part of the AE program. This research studies performance and acoustics for large- and small-scale aircraft, and also vertical-axis and horizontal-axis wind turbines. Of critical importance in this area is understanding aeroelastic effects and energy-absorbing structures for reduced vibration/fatigue and energy harvesting. Another key area is high Reynolds Number turbulence simulation through petascale computing. Here, investigators conduct cyber-enabled turbulence research and simulations of stratified, reacting, and wall-bounded flows.

Ultimately, AE's focus is on the future. The growth and success of unmanned aerial vehicles (UAVs) and critical need for highly fuel-efficient and environmentally responsible systems is leading to substantial innovation in aerospace configurations. The commonplace aircraft, with a cylindrical fuselage and moderately swept wings, is giving way to a wide array of blended wing-body, joined-wing, vertical take-off and land, hypersonic waverider, and even flapping wing vehicle designs. Many of these designs utilize highly integrated wing/body aerodynamics, composite structures, and integrated propulsion systems.

Faculty

Krishan Ahuja
Regents Professor
krishan.ahuja@gtri.gatech.edu

Stephen Ruffin
Professor
stephen.ruffin@ae.gatech.edu

Marilyn Smith
Professor
marilyn.smith@ae.gatech.edu

Narayanan Komerath
Professor
komerath@ae.gatech.edu

Lakshmi Sankar
Regents Professor
lsankar@ae.gatech.edu

Pui-Kuen Yeung
Professor
pk.yeung@ae.gatech.edu

Suresh Menon
Hightower Professor
suresh.menon@ae.gatech.edu

Jerry Seitzman
Professor
jerry.seitzman@ae.gatech.edu

Find out more: www.ae.gatech.edu/directory/faculty

Georgia Tech School of Aerospace Engineering

www.ae.gatech.edu ◻ info@ae.gatech.edu
404.894.6046