The Georgia Tech School of Aerospace Engineering graduate program in

Aeroelasticity & Structural Dynamics

At Georgia Tech's School of Aerospace Engineering, research in aeroelasticity and structural dynamics is led by a group of world-class experts who span the fields of fixed- and rotary¬wing aircraft, as well as spacecraft and wind energy.

The interdisciplinary field of aeroelasticity addresses these issues. It deals with interactions among aerodynamics, structural mechanics and dynamics. The related field of structural dynamics examines interactions between structural mechanics and dynamics.

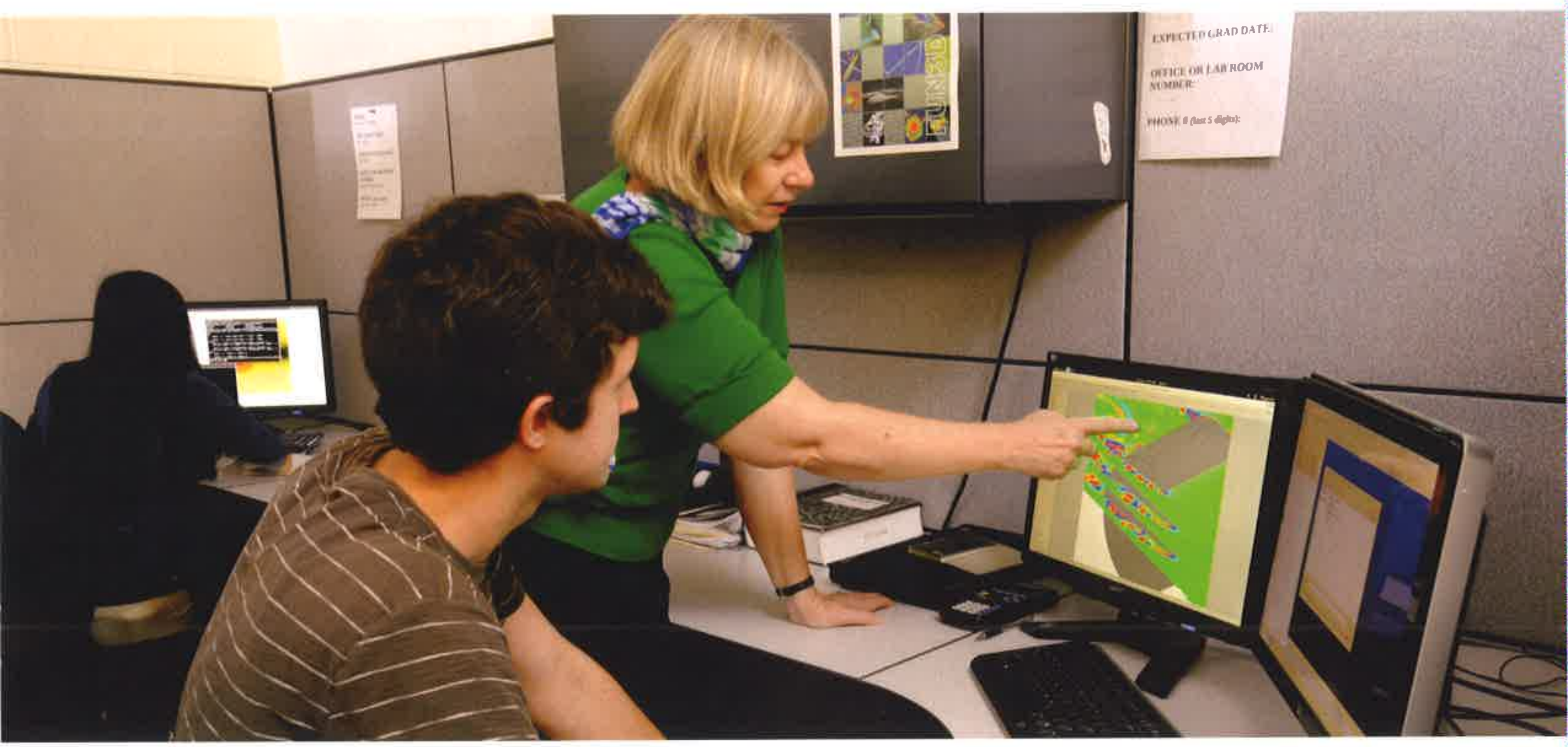
In flight, aircraft do not behave as rigid bodies. Structural deformation causes airloads to differ substantially from what they would be were the vehicle rigid. Wing and control surface flexibility mean that there are a variety of unstable behaviors that lead to degradation of structural integrity over time. These can shorten the life of the vehicle or even destroy it.

One major area of research focuses on developing conservative, high-fidelity nonlinear aeroelastic simulations algorithms and methodologies. Computational aeroelasticity may require the utilization of high¬order aerodynamic methods to capture the correct flow physics. This requires the marriage of computational fluid dynamics (CFD) and structural mechanics (CSM). Georgia Tech Aerospace Engineering faculty are developing these CFD/CSD methods with state-of-the-art solvers including OVERFLOW, FUN3D, and OpenFoam.

Meanwhile, research projects related to rotary-winged aircraft and wind energy focuses on techniques for vibration reduction, improved methods for calculation of stability, and methods for modeling composite rotor blades, dynamic stall, stall flutter, and tail wag/ buffet. They are also investigating of the effects of tightly-coupled elastic coupling on blade performance and stability, along with control algorithms.

In addition to research for rotating systems, fixed-wing projects focus on computational methods (transition and turbulence models, conservative algorithms), as well as analytical and experimental studies of buffeting, and aeroservoelasticity of composite-winged aircraft with wings of high-aspect ratio.

To exploit aeroelastic behavior, active and passive control devices, including biomimetically engineered devices such as multiple winglets, are in the works. Faculty are participating in the Aeroelastic Prediction Workshop, an international research effort to explore and refine the details of computational aeroelasticity in the nonlinear transonic flight regime.



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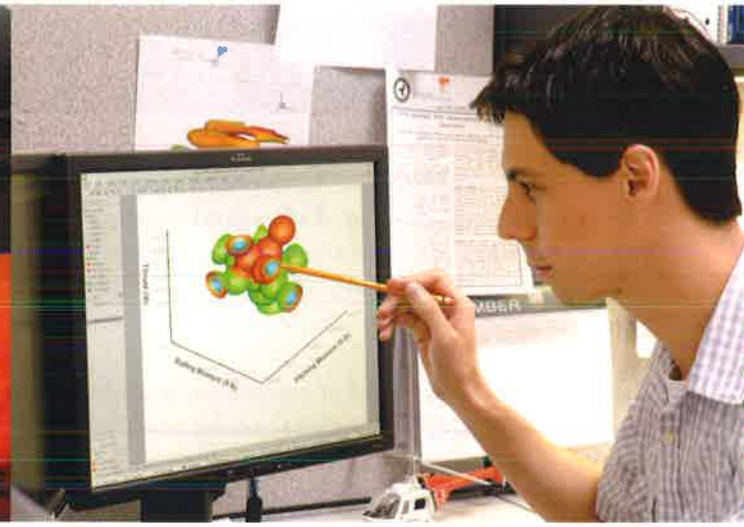

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