





Who We Are

Our charter is to provide high quality, cost effective engineering services and state-of-the-art technical solutions for government and industry. Customers come from a wide range of market segments including groups in aerospace, electric power generation, nuclear reactors, forest management, agrochemical applications, and pharmaceuticals. Since 1979, Continuum Dynamics, Inc. has undertaken a wide range of research and development activities including:

- » Contract Research
- » Engineering and Design Services
- » Simulation Software Development and Licensing
- » Shape Memory Alloy Actuator Development
- » Flight Test Support
- » Environmental Software Development

Our Expertise

Our significant experience allows us to address a wide range of challenging problems for our customers. From an original focus on fluid dynamic phenomena in critical aeronautical and power generation activities, our work and staff expertise has expanded substantially, and encompasses both our original organizational strengths and new capabilities. Core areas of expertise include:

- » Rotorcraft Solutions: Comprehensive, full vehicle aeromechanics modeling software; blade design, noise analysis, and flight dynamics; real-time simulations, brownout, and high speed vehicle design.
- Fixed Wing Aircraft Solutions: Complete aircraft aerodynamics; flight control icing and upset conditions; dynamics of stores and jettisoned objects; analysis and mitigation of aircraft vortex wakes.
- Unmanned Air Vehicle (UAV) Solutions: Flight control system development, real-time aeroelastic simulations, low Reynolds number aeromechanics.
- » Airwake Modeling: Solution of ship, structure, and bluff body flows; high fidelity RANS/Euler CFD as well as databases for real-time simulations.
- » Flight Test Support: For rotorcraft, fixed wing aircraft, UAVs, and autogyros
- » Shape Memory Alloy Actuation: Lightweight in-flight actuators for vibration mitigation and flow control.



Flight Simulation

CDI has become a leader in the development of fast, physicsbased aerodynamic and flow field models for real time flight simulation and pilot training applications. Modular versions of our state-of-the-art CHARM and MAST air vehicle aerodynamics models are in use industry, providing validated alternatives to semi-empirical simulation databases for maneuvering rotorcraft in and out of ground effect, multiple aircraft interactions, brownout, and "edge of the envelope" simulations including sleep descent/vortex ring state. We continue to seek out new and innovative solutions to maximize simulation fidelity and to provide cost effective alternatives for pilot training.

Featured Products

CHARM

Comprehensive Hierarchical Aeromechanics Rotorcraft Model. CHARM is ideally suited for performing advanced rotorcraft aerodynamic design and research on emerging rotorcraft technologies and offers a high level of accuracy and computational performance as both a stand-alone analysis and a real-time module for flight simulations.

MAST

Multiple Aircraft Simulation Tool, a physics-based analysis enabling real-time flight simulation of multiple aircraft, including the wake influence of each aircraft. MAST can operate as a stand alone analysis or as a module couple to flight simulation software.

VorTran-M Wake Module

The VorTran-M module is a first-principles Eulerian vorticity transport wake module that provides an unprecedented ability to capture the true temporal and spatial structure of vortical flows when couple to a wide range of CFD (both Eulerian and Lagrangian) tools.

Application: Ship Airwake/Terrain Flow Field Effect Database

Using the complementary and unique capabilities of CDI's aerodynamic modeling tools, we are able to create high-fidelity models of airwake and terrain-correlated turbulence for aircraft and helicopter flight simulations. The modeling tools are robust and flexible, requiring no more than the simulation visualization models for input to the flow field analysis.

Applications

- » Rotorcraft Analysis & Design
- » Rotorcraft Flight Simulation
- » X-Plane/UAV Analysis & Design
- » Brownout Analysis & Simulation
- » Wind Turbine Analysis & Design
- » High Resolution Wake Modeling
- » Store Separation Analysis
- » Droplet Deposition & Trajectory
- Hi-Temperature Smart Materials
- » Shape-Memory Alloy Actuators
- » On Blade Devices
- » Rotor Testing

Facilities

CDI has approximately 20,000 square feet of office and laboratory space to support experimental and computational studies. To support computational studies CDI owns and operates a Beowulf-style computer cluster with over one hundred 64-bit computational cores. CDI also has a 1 ft. x 1 ft. low turbulence wind tunnel, several static rotor/propeller test stands, a 2 ft. low speed water tunnel, and a thermal hydraulics laboratory with an extensive array of testing equipment for various studies.







CDI low speed wind tunnel (left); rotor blade segment with SMA-actuated flap being tested in CDI's low speed tunnel (right).



Low speed water tunnel (left), variable geometry duct (right)





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