

# Active Aeroelastic Aircraft Testbed (A3TB)

- **Configuration:**

- Mutt-like geometry
  - 3 m span, 0.3 m chord
  - 22 deg swept wings, NACA0012
- Electric propulsion (pusher prop)
- Eight control-surfaces
- All 3D printed structure; 22 lb.
- Instrumentation: IMU, accelerometers
- FCS for altitude and airspeed. Tested in Hardware-in-the-loop simulation



- **Characteristics:**

- Approx. 20 min flight time
- Modular; Easy to assemble; Low cost

- **Performance:**

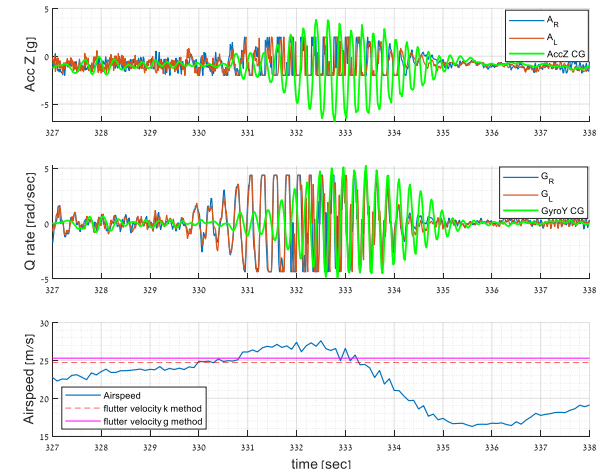
- Stall 18 m/s
- BFF Flutter (LCO) 24 m/s, 4.2 Hz

- **Models:**

- Nastran FEM – GVT validated
- ZAERO

- **Flight test data:**

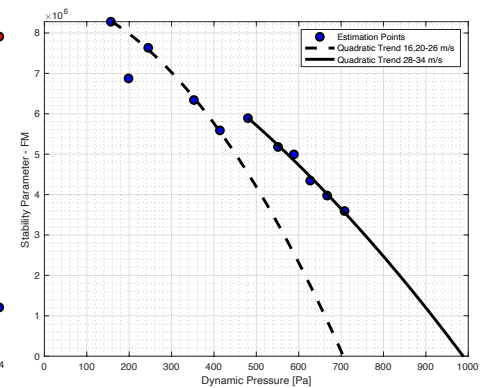
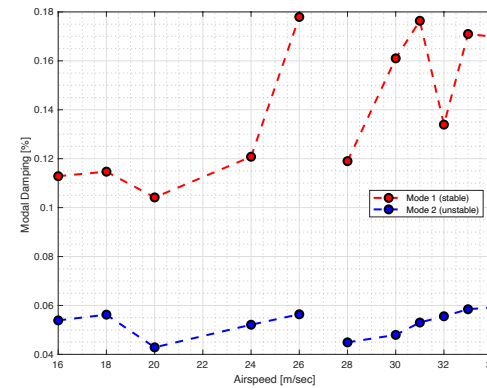
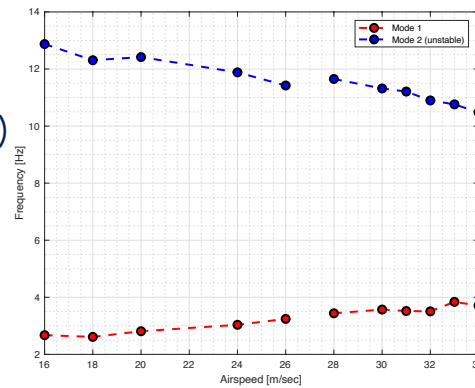
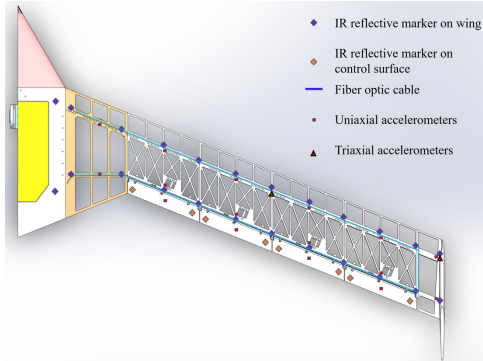
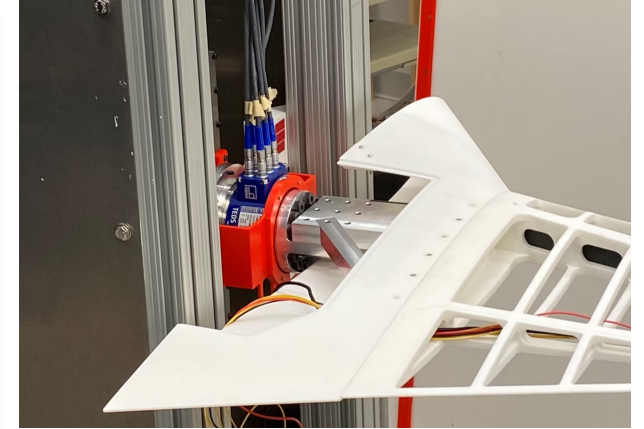
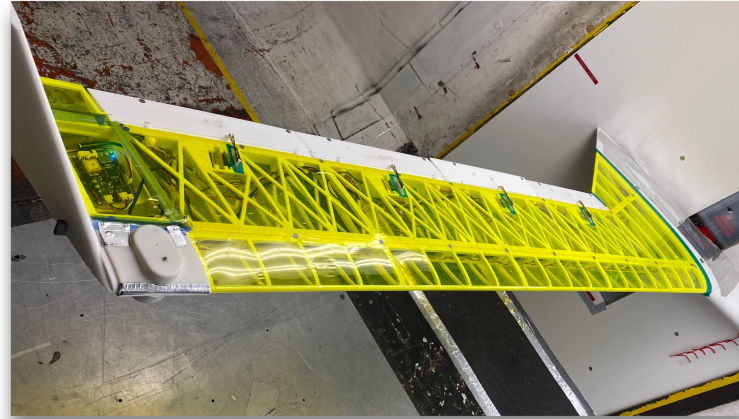
- IMUs



Joels et al., "Design, Analyses, and Flutter Testing of the Active Aeroelastic Aircraft Testbed (A3TB) Platform," SciTech 2022

# A3TB Wind Tunnel Model (A3TB-WT)

- Half-span A3TB, clamped wing
- Tested at the Univ. of Michigan low-speed tunnel on a clamped PAPA
- **Instrumentation:**
  - Motion Recovery System
  - Fiber optics strain sensors (Approx. 400 sensing points)
  - Accelerometers
- **Data available:**
  - Responses to free turbulence
  - Responses to CS excitation 1-10 Hz (chirp)
  - Tested airspeeds 16-26 m/s, 26-39 m/s (34 for FOS)
  - More tests can be conducted



Sharqi et al., "3D-Printed Swept-Wing Wind Tunnel Model Characterization for Aeroelastic Studies," IFASD 2022

Ben-Asher and Raveh, "Improvements to Wind-Tunnel Flutter Prediction with Application to the Active Aeroelastic Aircraft Testbed Wind-Tunnel Model," SciTech 2023