

# Computers in engineering

## Aerospace Toolbox facilitates flight-data analysis

Thanks to a new software suite recently introduced by **The MathWorks**, engineers can now more easily perform advanced aerospace analysis when developing and evaluating designs.

Aerospace Toolbox provides reference standards, environmental models, support for aerodynamic coefficient importing, and 3-D visualization capabilities in Matlab. A built-in interface to FlightGear flight simulator allows engineers to visualize flight data in a 3-D environment and reconstruct behavioral abnormalities in flight-test results. By streamlining aerospace data analysis in Matlab, the toolbox accelerates the design and development of aerospace and defense systems.

develop algorithms for navigation and geodesy applications.

To ensure design consistency, Aerospace Toolbox includes utilities for unit conversions, coordinate transformations, and quaternion math. The unit conversion utilities convert physical properties such as acceleration, density, and temperature between English and metric units; the axes transformation tool creates direction cosine matrices and converts spatial representations between Euler and quaternion vectors; and the flight parameter utilities calculate such common parameters as equivalent airspeed, Mach number, and dynamic pressure.

Aerodynamic coefficients from the **U.S. Air Force** Digital Data Compendium



```
% Open a FlightGearAnimation object.
fg=fganimation;

% Convert Latitude, Longitude and Euler angles from
% degrees to radians using the 'convang' function and
% set FlightGearAnimation object properties for timeseries.
fg.TimeseriesSource = [myflightdata(:,1) ...
convang(myflightdata(:,[3 2]),'deg','rad') ...
myflightdata(:,4) ...
convang(myflightdata(:,5:7),'deg','rad')];

% Play Back the Flight Trajectory
fg.play;
```

**Aerospace Toolbox is interfaced with FlightGear flight simulator to visualize the flight data of a Boeing 777.**

"Aerospace Toolbox includes a broad range of aerospace functions for Matlab so that engineers can focus on their areas of expertise instead of programming tasks," said Jason Ghidella, Technical Marketing Manager, The MathWorks. "Engineers no longer need to spend time maintaining in-house aerospace utilities or updating environmental models."

The suite comes with standards-based environmental models for atmosphere, gravity, and magnetic fields. The atmospheric models help calculate ambient flight conditions and normalize flight data, while the gravity and magnetic field models help analyze data and

(Datcom), a computer program that uses flight conditions and aircraft geometry to estimate the aerodynamic stability and control characteristics of aircraft, can be imported into Matlab, via Aerospace Toolbox, to carry out preliminary control design and vehicle performance analysis. Previously, these inputs had to be input manually.

Aerospace Toolbox also includes a function for controlling the position and attitude of a vehicle in FlightGear flight simulator by using double-precision values of longitude, latitude, altitude, roll, pitch, and yaw from Matlab.

*Matt Monaghan*

## Briefs

**Quantum3D** has entered into an agreement with the **U.S. Navy** Air Warfare Center Training Systems Division (NAWC-TSD) to collaborate on visual simulation and image generation systems and software tools for military and commercial research, development, and training simulation solutions. Quantum3D will assist NAWC-TSD in the evaluation and enhancement of the Navy's Aviation Simulation Master Plan Portable Source Initiative (NPSI) Data Preparation Standard (DPS). Quantum3D will provide software and services to evaluate the NPSI-DPS and to publish NPSI-DPS synthetic environments optimized for deployment on Quantum3D Independence IG Solutions and other vendors' image generators.

**NASA Glenn Research Center** selected **Green Hills Software's** Platform for Software Defined Radio (SDR) with **Spectrum Signal's** flex-Comm SDR-4000 reconfigurable, multifunction communications platform. The Green Hills solution provides NASA with the capabilities needed for rapid design, development, and refinement of its next-generation Space Telecommunications System Architecture (STRS). The use of SDR and STRS technology provides NASA the capability to support advanced space and ground-based communications operations while reducing the cost of future missions.

**Starchaser Industries**, which specializes in the development, operation, and commercialization of space-related products for both the micro-satellite and space tourism markets, renewed its commitment to **PTC's** Pro/Engineer CAD/CAM/CAE solution for another three years. Pro/Engineer, in combination with Pro/Engineer Mechanica, is used in all areas of research and development of rockets, rocket engines, and other systems.

**LMS** has expanded its Eastern European software development and engineering center in Brasov, Romania, increasing its workforce in the area to 100 employees. To support its expansion in Eastern Europe, LMS has also begun a partnership with the College of Engineering of the **Transilvania University** of Brasov. Through the partnership, LMS and Transilvania University created the Engineering Center for Automotive & Aerospace (ECAA) as a joint center of excellence in engineering. The ECAA organizes training programs in physical testing and simulation and develops joint R&D programs, with a focus on mechatronics engineering applications in the automotive and aerospace industries.