Aircraft Control Toolbox Learning Edition
for use with MATLAB®

The Aircraft Control Toolbox Learning Edition contains all the necessary tools a student will need to design and simulate control systems for aircraft. The Learning Edition includes full access to source code so you can see what the tools are doing and also allows you to easily customize them for your own use. Unlike other packages, you are dealing with any black boxes.

Key Features
The Aircraft Control Toolbox Learning Edition provides a comprehensive set of functions including:

- Aircraft dynamic modeling including flexibility, actuator, sensor and engine dynamics
- Aircraft control system design and analysis including classical, eigenstructure assignment, output feedback and many other design methodologies
- Atmospheric modeling including disturbances such as wind gusts
- Nonlinear models for military and commercial aircraft including subsonic and supersonic aircraft with all data contained in a convenient database format
- A modular nonlinear aircraft simulation that can simulate aircraft form the earth's surface to the upper atmosphere
- A modular function for implementing your own control system in the nonlinear simulation
- Several complete simulation examples

Built-in Aircraft
Aircraft properties are easily accessible to speed your design work. The following plot shoes the x-axis aerodynamic force coefficient for a simplified F-16 model obtained by typing *F16('cx coeff')*:
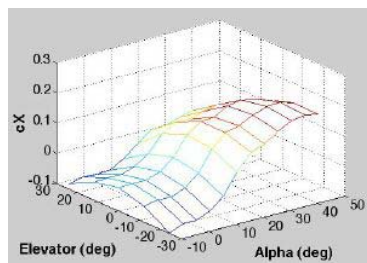

A Control Configured Vehicle (CCV) type linear aircraft model is also included. If you type: CCV, You will get a plot of the eigenstructure, a singular value plot and step responses. The eigenstructure plot is shown below. This plot gives you a quick view of the level of interaction between the different states.

Notice that each state is labeled, a feature of the state space class.
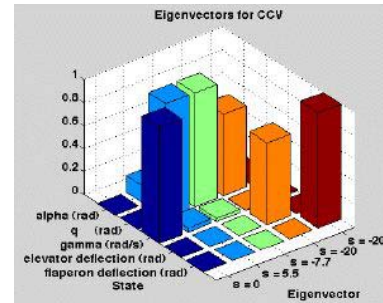
Graphics and Simulation
The toolbox allows you to fly any of your designs using its graphical user interface. The interface is shown below.
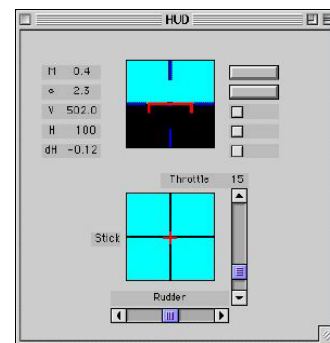
Using the controls, you can fly your aircraft like any other flight simulator, only the dynamics are accurate. The nonlinear simulation allows you to add flexible aircraft components, sensor and actuator dynamics, engine dynamics and disturbances dynamics. Pilot models are included. The mass is included as a state so that you can model the effects of fuel consumption. The simulation uses an ellipsoidal earth model so you can simulate aircraft form the ground up into space.

You can import geometric models of aircraft from OBJ and AutoCAD DXF files.

Simulations are setup using simple MATLAB scripts which you can easily write and customize. Several example scripts are included in the toolbox.

The simulation function also will automatically linearized the nonlinear dynamics and generate a state-space model. In addition, a trimming algorithm is included which can trim you aircraft in a variety of flight modes.

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