



3DEXPERIENCE®

CATIA SYSTEMS ENGINEERING  
**FLIGHT DYNAMICS LIBRARY**



**ACCURATELY  
SIMULATE THE  
FLIGHT DYNAMICS  
OF AIRCRAFT AND  
UNMANNED AERIAL  
VEHICLES**

The Modelica based Flight Dynamics library enables the rapid modeling, simulation and analysis of the flight dynamic characteristics of a wide range of flight vehicles. The library is ideal for the multi-disciplinary development of accurate flight control laws as well as for use in real-time flight simulators for commercial and military aircraft, unmanned aerial vehicles (UAVs), airships and rotorcraft.

## TYPICAL USE CASES

- **Aircraft Design**  
Assess the impact of aircraft design configuration changes on flight characteristics early in the design process.
- **Flight Control Law Design**  
Design and analyze multi-disciplinary flight dynamic control laws for flight and system dynamics.
- **Mission Simulation and Optimization**  
Rapidly execute mission simulations to assess flight performance or to optimize flight trajectories to minimize fuel burn, emissions and flight time.
- **Real-Time Simulation**  
Leverage accurate flight dynamic models and realistic visualization to create real-time simulators for training pilots and product marketing.

## KEY FEATURES

- **Full Compatibility with Standard Libraries**  
Develop and interconnect airframe and systems models using standard mechanical connectors.
- **Scalable Complexity**  
Quickly switch between point mass or full six-degrees-of-freedom equations of motion, local geodetic or WGS'84 position states, velocity states in body or flight path coordinates via a single parameter.
- **Detailed Environment Models**  
Simulate one or more aircraft in a single model using a common detailed gravity, magnetic field, terrain, wind and atmospheric models.
- **Accurate Trimming**  
Accurately initialize flight dynamic models to their desired initial state.

## LIBRARY CONTENTS

### Flight Vehicle Components

- Aerodynamics and Propulsion base classes
- Airframes and Kinematic components
- Weight and Balance components
- Sensor and Control systems

### Environment Models

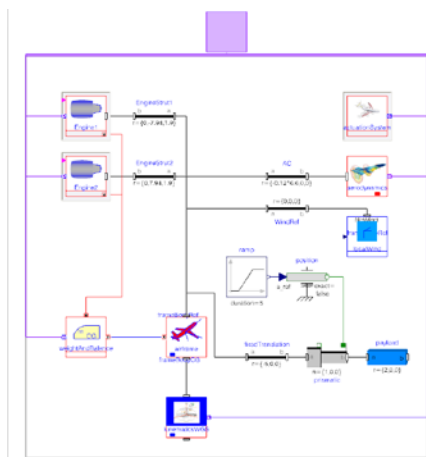
- Earth and Terrain models
- Atmosphere and Wind models
- Ground Objects

### Interfaces

- Flight Gear visualization
- External Devices input

## BENEFITS

- True multi-disciplinary modeling and simulation of aircraft flight dynamics
- Supports simulation from on-ground operations through to high speed and high altitude flights
- Model complexity can be easily scaled to enable analysis and simulation at any stage of the design process
- Improved model maintenance through the use of a single tool for modeling, control and simulation
- Ability to integrate with a wide range of other compatible Modelica libraries



Typical Flight Dynamics Model

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