

Implementation of a Modelica Library for Simulation of Electromechanical Actuators for Aircraft and Helicopters

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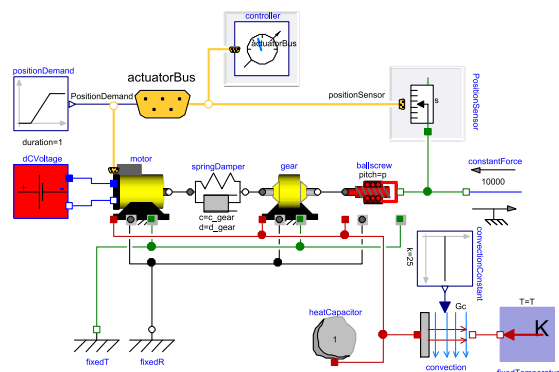
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Protecting the environment and providing efficient onboard energy supply is amongst the top targets in the development of future aircraft. Various research initiatives have been launched in recent years to get closer to this goal. The ACTUATION2015 project [1] will complete this approach by focusing on Electro Mechanical Actuator (EMA) technologies. EMAs are mandatory in order to eliminate hydraulic circuits, pumps and reservoirs. The goal of the A2015 library presented in this paper is to develop a Modelica based, tool-independent standard for electromechanical actuator libraries.

Since the intended use of the library includes all development stages from concept assessment to virtual design validation several models of different scope and level of detail are implemented for the core EMA components (multi-level approach). Five modeling levels are predefined, mostly associated with nonlinearities included and events triggered. The library does allow for modeling redundant actuators (which are needed because EMAs have lower reliability than conventional hydraulic actuators) and uses a unified approach for component failure injection.

The A2015 library contains models from various domains: Electrical (inverters, motors), mechanical (rotation to rotation and rotation to translation transformers), sensors (position, speed, force, etc.), thermal (heat sinks, housings), and control (e.g. force fight compensator). Selected library components and their implementation are described in the paper. A typical application example is given and discussed (A320 aileron).



References

- [1] www.actuation2015.eu