
Modeling and Simulation of Dual Redundant Electro-Hydrostatic Actuation System with Special Focus on Model Architecting and Multidisciplinary Effects

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Abstract

Electro-hydrostatic actuator (EHA) is a new trend in the more electric aircraft related research works and engineering applications. As a high-performance mechatronics product, however, the physical effects of actuator behavior are multidisciplinary, coupled and strongly nonlinear. Although many commercialized multi-domain and system-level simulation packages exist, they are rarely considered and analyzed as a whole, lacking of a unified model architecture, efficient modeling forms, and comprehensive simulation verification. In this paper, Modelica is used to build a multi-domain virtual prototype of the dual redundant electro-hydrostatic actuation system (DREHAS) that consists of two EHAs in parallel, which supports multi-view modeling and interdisciplinary application of the system. Finally, a simulation application case of the elevator actuation system is presented to demonstrate the effective role of Modelica models in system modeling and evaluation.

Keywords: more electric aircraft, dual redundant electro-hydrostatic actuator, working mode, system model, Modelica