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## Architecture Design and Evaluation of Electrical Trimmable Horizontal Stabilizer Actuation System for More Electric Aircraft

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**Abstract:** Electrical trimmable horizontal stabilizer actuation system is a special electromechanical actuation system with redundant electrical power drive paths and complex mechanical transmission loads, which drives the trimmable horizontal stabilizer to achieve the pitching work of the aircraft. However, the current architecture design of the electrical trimmable horizontal stabilizer actuation system lacks a systematic and integrated design process and evaluation index, which leads to long development cycle, low reliability, and a large design margin of the new system. To solve this problem, a systematic architecture design and evaluation method based on the lightweight index is proposed. At the beginning of the design of the system redundancy architecture, a heuristic algorithm is used to determine the number of system redundancy and the configuration of the redundancy scheme. The components of the system are analyzed and reviewed in detail, and the parameters of each component are designed based on the scaling laws. From the 32 possible schemes, 4 typical architectures are selected to analyze the influence of the form of the redundancy configuration, form of component function and the main design parameters on the weight of the architecture. Finally, the automatic generation, screening and quantitative evaluation of the architecture are realized, which provides technical support for the design and development of a domestic electrical trimmable horizontal stabilizer actuation system and the application of redundant electromechanical actuation system for the key flight control surfaces.

**Key Words:** trimmable horizontal stabilizer actuator; architecture design; redundant configuration; load path; lightweighting

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