

Multi-Model Based Fault Detection for the Power System of More Electric Aircraft

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Seventh Asian Control Conference, August 2009

Abstract — this paper presents a suitable scheme for the fault detection and isolation of a high voltage DC electrical network in more electric aircraft. Concerning a more electric aircraft architecture comprising one variable frequency generator, on 18-pulse autotransformer, power electronic converters, high voltage DC transmission lines, electromagnetic actuators and numerous constant electrical loads e.g. lighting and PCs, the multi-model detection approach reveals more convenience and feasibility to undertake fault analysis at network level regarding the dynamic change of electrical loads. Right-sized system modelling, computer-aided trimming and linearization with Dymola are discussed. Nullspace based approach is used for synthesis of residual generator. As demonstration, an application case where a short circuit fault occurs on the output of a buck converter in the more electric aircraft is considered. The designed residual generators are validated on the original nonlinear system with time-domain simulation.