

Thesis Project : Protection Algorithm for a Series-Hybrid-Electric Aircraft Propulsion System

The thesis can be written in German or English.

Anmerkung (Deutsch): Diese Masterarbeit eignet sich besonders für Studierende der Elektrotechnik, Energietechnik, Leistungselektronik und der erneuerbaren Energien, die sich für die Elektrifizierung von Flugzeugen interessieren.

Note: This Master thesis is especially suitable for students from the field of electrical engineering, power systems engineering, power electronics, and renewable energy engineering students who are interested in working in projects related to the electrification of aircrafts.

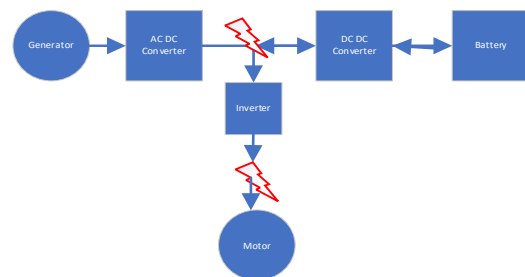
Background

The aviation industry is moving to electrification of aircraft to reduce emissions and fuel costs. It is still a challenge to safely operate the onboard electrical power distribution network of the aircraft propulsion system. In the project ETHAN (Secure and reliable electric and thermal networks for hybrid-electric propulsion systems), we are working with industry partners like Rolls-Royce Electrical and other Universities to develop environmentally friendly and secure electrical and hybrid electrical propulsion systems for eVTOLs and smaller aircraft with 9 passengers' capacity (Pax9). A high degree of safety is a parameter that needs to be considered in the development of these aircrafts. In the Chair of Mobile Electric Energy Systems, we develop electrical models for these aircrafts and test protection strategies and algorithms in simulations and real-time hardware like OpalRT and Speedgoat.



Hybrid-electric commuter aircraft – Nine Passenger (Pax 9)

Source : Nine Passenger (PAX 9) Commuter aircraft with Serial Hybrid Architecture, Rolls-Royce Electrical, 2024



Pax 9 Commuter Aircraft simplified sample Electrical network

Tasks:

- Use self-developed model or the model developed at TU Braunschweig with Matlab /Simscape to develop protection algorithms for a range of faults in the onboard aircraft Propulsion System (example: short circuit, ground fault, overload)
- Propose protection strategies and/or develop a protection algorithm

Desired competences:

- Modelling of electrical and power electronic systems
- Modelling and Programming skills in Matlab

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