mb + Partner
Luftfahrt Technologie

TU Delft

DLR

TUHH
Technische
Universität
Hamburg

Master's Thesis

Conceptual Design of a uSTOL Launch and Landing System for Fixed Wing UAV

Description

Unmanned aircraft (UAV / „drones") are one of the most dynamic fields with the aerospace industry. It becomes increasingly evident that drones can address many socio-technological problems outside the area of classical aviation contexts – e.g. sustainable transition of the energy system. Start-ups like *AmpyxPower* (ampyxpower.com), *SkySails* (skysails-group.com) and others see airborne wind harvesting as a source of renewable wind energy and are developing industrial size demonstrators with several hundred kW up to MW of power. Their aim: Harvesting the strong and steady high altitude winds (>500m) with a tethered airfoil. For that purpose, the ability to deploy drones on short offshore platforms (uSTOL, see figure) is absolutely crucial. Hence, airborne wind energy start-ups are on the outlook for possible technical solutions.

Within the thesis, the conceptual design focusses on two major parts. First, developing a so-called standard uSTOL Launch and Landing system that fits several use case (main component). Second, building upon the first part, designing a technical solution (module) for the use case of airborne wind energy considering real-life requirements and conditions. Building upon the existing ElektRail research demonstrator and its key technology components (e.g. sensor systems, control system), the overall goal is to develop a long stator linear actuator and interface concept for various uSTOL applications. The main tasks are:

Tasks

- Introduction to the problem and literature research
- Identification & definition of both general and use case specific requirements
- Methodic development and evaluation of suitable long stator linear motor actuation concepts
- Consideration and proof of feasibility of modular design principles for further use cases
- Preliminary CAD design of the selected concepts and solutions (main component and module)
- Modelling of system dynamics building upon the existing simulation model of the functional demonstrator
- Estimation of system costs for main component and module
- Evaluation and documentation of results

Requirements

- Strong knowledge of system and structural design (especially electro-mechanical systems)
- Experience with the simulation of dynamic systems and control engineering
- Excellent communication and presentation skills

Beginning, Duration, and Location

As of now, for about 9 months, Hamburg, financial compensation available

Contact & Application

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