



The German Aerospace Center (DLR) is the national aerospace research center and space agency of Germany. About 7000 employees do research in the fields of aeronautics, astronautics, energy, transportation and security in 16 different locations.

The Department of Unmanned Aircraft at DLR's Institute of Flight Systems in Braunschweig offers now a(n)

INTERNSHIP, BACHELOR / MASTER THESIS

titled:

"Dynamical Modeling and Simulation of Air-to-Air Refueling Hose and Drogue System"

Introduction:

The Department of Unmanned Aircraft at DLR's Institute of Flight Systems operates the unmanned fixed-wing aircraft Prometheus (Fig.1) and Micro Air Lab (MAL, Fig.2), which have about 3 meters of wing span. One research focus at the Department is simulating and flight testing autonomous air-to-air refueling of unmanned aircraft, with the 'probe and drogue' refueling method. The Prometheus UAV is planned to be used as the receiver aircraft, which will be equipped with a refueling probe. The MAL UAV is planned to be used as the tanker aircraft and it will be equipped with a refueling hose and drogue system (Fig.3a).

Before flight testing the autonomous air-to-air refueling, the whole procedure will be simulated on the computer. For this phase, a dynamical model of the hose and drogue system (Fig.3b) is needed.

Deliverables of the Work:

Besides the relevant documentation, at the end of this work, a realistic dynamical model of the hose and drogue system is aimed to be obtained.

General Plan of the Work:

- Literature review of existing hose & drogue dynamical modeling approaches
- Selection of the approach to be used
- Building the dynamical model in Matlab / Simulink (or in Dymola)
- Simulating the probe and drogue behavior during flight under the effect of atmospheric turbulence, tanker wake, probe and drogue interaction, etc.
- Documenting the results.

Desired Qualifications:

- Mechanical / aerospace engineering studies
- Programming experience with Matlab / Simulink
- Knowledge in flight mechanics and aerodynamics
- Proficiency in written and spoken English
- Ability to work independently

Work Period: 3-6 Months



Fig. 1: Prometheus UAV



Fig.2: MAL UAV

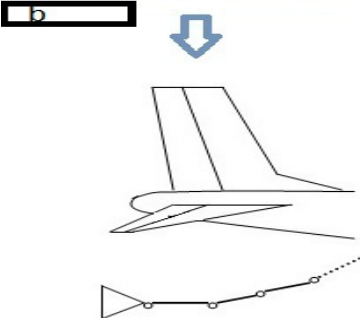


Fig.3: (a) Hose and drogue system [http://www.aviationweek.com], (b) and a modeling approach

Deutsches Zentrum
für Luft- und Raumfahrt e.V.
German Aerospace Center

Institute of Flight Systems
Department of Unmanned Aircraft
Lilienthalplatz 7
D-38108 Braunschweig

MSc. Mehmet Kılıç
Phone: +49 531 295 - 3197
Fax: +49 531 295 - 2647
mehmet.kilic@dlr.de
www.dlr.de/ft