Bachelor Thesis/ Term Project (Semesterarbeit)/ Master Thesis
at the Institute of Helicopter Technology

# Development and Validation of Helicopter Pilot-Controller-Vehicle Models

Mathematical models of pilot biodynamics simplify the evaluation of an aircraft's handling qualities. The benefit is that the pilot-controller-vehicle closed-loop system can be tested without human pilots.

The Institute of Helicopter Technology boasts of a highly realistic rotorcraft simulation environment with a wide-screen, high-fidelity visual displays and an advanced flight controller/autopilot for agile and precise maneuvering. There is a rich source of data from several flight tests conducted with experimental test pilots on the simulator.

## Scope of Work:

We offer an exciting opportunity to develop human biodynamic models for our rotorcraft simulation environment. The student will have the chance to study the factors influencing a human pilot's actions in a helicopter cockpit with different autopilot modes.

The student will analyze data from a recent test campaign conducted with experimental pilots and different flight control modes. The student will study the relevant human pilot models given in the literature. The ultimate goal is to develop a suitable pilot-controller-vehicle system model that can replicate similar pilot behavior in helicopter flight tasks as the human pilots.

## Skills:

1. Knowledge of feedback control theory (state space methods, PID controllers…)
2. Familiarity with frequency domain analyses (Bode plots, stability margins…)
3. Interest in mathematical modeling

## Tools:

Matlab script, Simulink modeling

## Language:

German or English

## Start:

SoSe 2021 or ASAP

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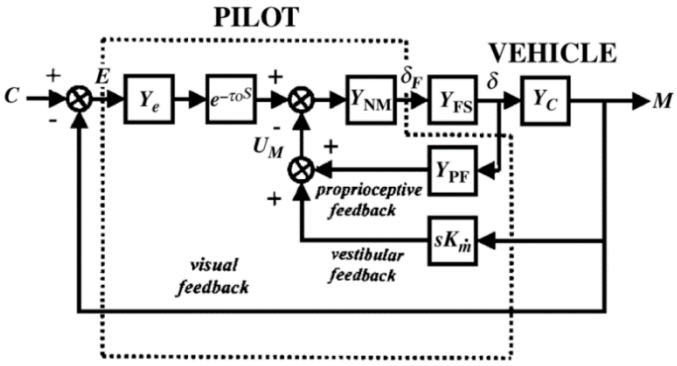


Rotorcraft Simulation Environment (above)
Hess structural model of the human pilot (below)