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DESIGN OF A WINCH; MODELLING & CONTROL OF THE TETHERED FLIGHT OF A MODEL AIRPLANE

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Design of a winch

The plane is attached to a carousel by a tether, providing the possibility for a rotational start. Once in the air our winch controls the tether length. The winch is fast and strong because it has to 'pump' the plane in the air like a kite on the beach. Beside motor mode, generator mode is provided in order to generate power out of the flight pattern.

To estimate this power a cable force sensor is designed to measure the tension in the cable at all times. Beside this, the sensor can also improve the safety by giving a warning when the force becomes too high.

Modelling and Control

Pitch and roll are controlled using a PID-controller which steers the elevator and the ailerons. The parameters used to describe the model in the simulation were first derived from estimations and later from measurements in a wind tunnel.