

# Path Following Model Predictive Control for Power Kites

## Master Thesis

Power kites are used to tow vessels or to generate electrical energy from high altitude wind in an efficient and sustainable manner. This technology has gained a lot of scientific attention in recent years and is starting to gain economical interest too. At our department various control mechanisms for towing kites have been considered, and model predictive path following was among the most promising approaches.

A basic setup with mostly constant environment conditions and a fully measurable state has been considered so far. In this master thesis, we would like to design a more realistic measurement setup and integrate it into the existing control loop. Subsequently, the existing controller must be adapted to the new conditions, and various scenarios should be considered in the new simulation environment.

Depending on the Students progress and interest, the control scheme can be extended to pumping kites, which are used to generate electrical energy. For this purpose, a suitable model must be selected, for which an optimal trajectory must be found. Then, the performance of the controller can be evaluated, and the results compared to the ones obtained for the towing kite model.

The student should have a good grasp of programming in Python and will be provided with an existing code base for reference. All results, including code, must be well documented and should be presented in a suitable manner. The thesis can be written in either English or German.



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