Modeling of a Rotating Pair of Tethered Wings for Offshore Wind Energy with Tensile Torque Transfer to the Ground

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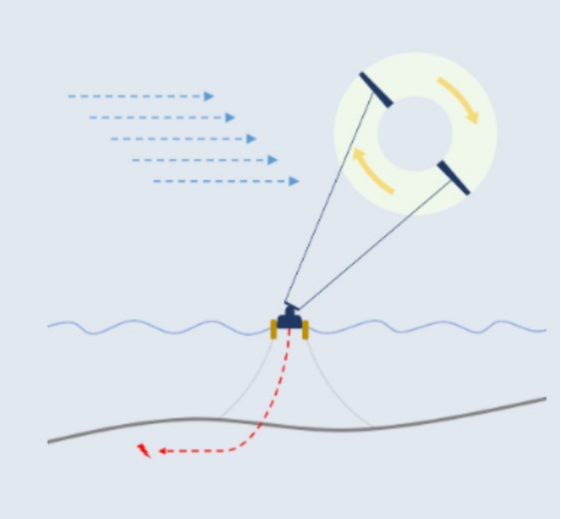
Introduction

Airborne wind energy can make it possible to harvest wind with a lot lower resources, it can save 80% to 90% of the mass of a wind energy system. This is in particular a large advantage for floating offshore wind, where the floaters cause a large cost factor.

A very new concept is a rotating pair of wings, which has the following advantages:

1. continues power production
2. low mass, costs and complexity
3. automated launch and landing is straightforward



Research questions

- How much torque and power can such a system transfer?
- What are the parameters that influence this?
- What are the trade-offs for achieving high power at a low mass?
- What is the bending moment of such a system, compared with a conventional, horizontal axis wind turbine?

Methodology

Implement a simplified model of the system. A software framework for modeling airborne wind energy systems exists, you would have to extend the given framework for this type of wing and this type of configuration. Depending on time and progress, a simplified, quasi-steady model and/or a full dynamic model can be developed. Programming skills in Python or Julia are required.

References

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