TUDelft

Delft University of Technology

Airborne Wind Energy Simulation Software
a Review

Fechner, U.; Schmehl, R.

Important note
To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Airborne Wind Energy Simulation Software - a Review

Uwe Fechner, Roland Schmehl

Delft University of Technology, The Netherlands

Uwe Fechner

Senior Researcher
Delft Centre for Systems and Control
Delft University of Technology

Mekelweg 2
2628 CD, Delft, The Netherlands
The Netherlands

u.fechner-1@tudelft.nl
www.tudelft.nl/en/3me

Various software packages exist for the simulation of airborne wind energy systems, but are they good enough to answer the basic question: How much energy can be harvested with a system of a given size at a given location?

I give a review of nine software packages with a focus on dynamic simulators, and also include one software that uses a quasi-steady model for wind resource analysis. Only fully or partially open-source software that allows the simulation of an AWE system is included in this review.

Dynamic simulators can be used for the design of a system, control research and to derive a power curve and cut-in and cut-out wind speeds. Furthermore they can be used to investigate the loads that have an impact on the lifetime and costs of a system, and also to derive other parameters that are needed to create and parameterize a quasi-steady simulation that can be used for wind resource analysis.

It was found that many of the software packages are very hard to install and/or unmaintained. Some of the simulators neglect the impact of the ground station or operate only at a few, discrete wind speeds which limits their use to derive a power curve. For the three major AWE concepts, pumping mode rigid wing, pumping mode soft wing and airborne generators working simulators are available, but many wishes remain open.

This work was inspired by our participation in the AWE working group of the International Energy Agency [2,3].
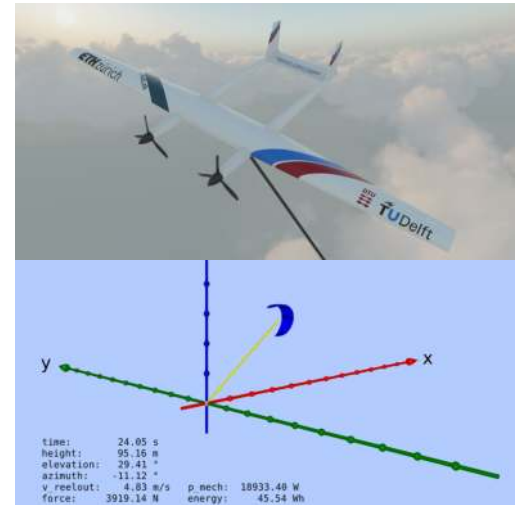
MegAWES and KiteSimulators.jl

References:

[1] Fechner, U., Vlugt, R. V. D., Schreuder, E. & Schmehl, R. (2015). Dynamic Model of a Pumping Kite Power System. Renewable Energy, 83, 705–716. doi:10.1016/j.renene.2015.04.028

[2] IEA WP1: Resource potential and markets, https://iea-wind.org/task48/task48-activities/task48-activities-wp1/

[3] IEA WP2: Reference models, tools and metrics, https://iea-wind.org/task48/task48-activities/task48-activities-wp2/