Implementation of the Actuator Cylinder Flow Model in the HAWC2 code for Aeroelastic Simulations on Vertical Axis Wind Turbines - DTU Orbit (26/12/2018)

The paper presents the implementation of the Actuator Cylinder (AC) flow model in the HAWC2 aeroelastic code originally developed for simulation of Horizontal Axis Wind Turbine (HAWT) aeroelasticity. This is done within the DeepWind project where the main objective is to explore the competitiveness of VAWTs for floating MW concepts. The AC model is a 2D flow model and has thus some advantages compared with the stream tube models often used in VAWT aerodynamic and aeroelastic simulation models. A major finding presented in the present paper is a simple way to correct the results from the linear version of the AC model so that they correlate closely with the results of the full AC model. The linear model has very low computational requirements and is thus well suited for implementation in an aeroelastic model where the induction in a number of points on the rotor swept surface is updated at each time step. The AC model is described and the implementation of the model in HAWC2 is briefly presented. Results illustrating the accuracy of the different versions of the AC model are presented. Finally, initial simulations on the 5MW baseline rotor with the new HAWC2 version with the AC model implemented are presented.

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