

Interactive comment on “Aerodynamic Performance of the NREL S826 Airfoil in Icing Conditions” by Julie Krøgenes et al.

Anonymous Referee #1

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The manuscript presents an experimental and a numerical study on the performance analysis of a S826 airfoil profile under icing conditions. Ice profiles predicted by LEWICE are 3-D printed and attached to the leading edge of a model for the experimental study. Rime, glaze and mixed type ice profiles are considered. In wind tunnel experiments the aerodynamic loads at various angle of attacks and Reynolds numbers are measured. A commercial flow solver FENSAP-ICE and an open source panel code, XFOIL, are used for the numerical solutions.

The major weakness of the study:

1- It is a performance analysis based on 2D, steady flows. Similar studies were already performed and published in the past such as:

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W. J. Jasinski, S.c. Noe, M.S. Selig and M. B. Bragg., Wind Turbine Performance Under Icing Conditions, Journal of Solar Engineering, Vol.120, pp. 60-65, Feb 1998.

Bragg, M.B, Broeren, A.P., Andy H.E., Potapczuk, M.G., Guffond D. and Montreuil E., Airfoil Ice-Accretion Aerodynamics Simulation, NASA/TM-2008-214830, Jan 2008

The current state of the art in research on icing of airfoils is more on 3D unsteady flow simulations and accurate predictions of ice accretion, and power losses.

In addition;

2- The study employs commercial or well-known open source tools which are developed in 1980s, and do not need validation. It does not help the objective of the study.

3- It is stated that "for the sake of simplicity, LEWICE was used for the ice generation and FENSAP only as a flow field solver.." FENSAP-ICE is a newer and more advanced approach to icing. It is not clear how such a choice serves the main objective of the study: "to obtain more knowledge about the effects of different ice accretions.."

4- The ice shapes given in Fig 1 are all mixed-up. The horn-ice shape in red should be the glaze ice, the smooth one in green is the rime ice and the blue is the mixed type.

5- "airfoil coefficients" used throughout the manuscript is a misnomer. It should be properly addressed as "aerodynamic force coefficients"..

In conclusion, the study, which is performed with well known tools and is based on 2D steady flows, does not contribute much to the state of the art in aerodynamics of iced turbine blades...

Interactive comment on Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2017-39>, 2017.