**WIND ENERGY SCIENCE**
**DISCUSSIONS**

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# *Interactive comment on* "Actuator Line Simulations of Wind Turbine Wakes Using the Lattice Boltzmann Method" *by* Henrik Asmuth et al.

**Anonymous Referee #1**

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The authors investigate the applicability of the very promising Lattice Boltzmann Method (LBM) to LES wind turbine wake simulations. They validate their actuator line implementation with an established finite volume solver for uniform inflow. Furthermore, they investigate the potential of ILES LBM methods. They report significant time savings for their LBM code over the NS solver. Their contribution is novel and of high scientific relevance. In general the paper is well structured and of high written quality. Figures are informative and nicely presented.

The level of detail given is sufficient most of the times, however is lacking in some

areas. The introduction to the LBM method needs improvement. Whilst trying to be basic it still assumes a lot of in-depth background knowledge and the notation is inconsistent at times, leading to confusion. Choices of the numerical setup remain unclear and need to be discussed in more detail, especially the sensitivity of their results to those choices. The authors also should try to avoid subjective statements and rely on quantitative evidence.

Even though the authors mention in the conclusion that "..., the presented work underlines the great potential of wind turbine simulations using the LBM", there is no code-to-code comparison for turbulent inflow cases. They are right to argue that it is difficult to have similar inflow turbulence for both codes (this is also the case when comparing vortex methods with FV solutions), however this should not stop them from conducting at least an initial investigation. Predicting the transition characteristics in uniform inflow, though of academic relevance, might not be the best showcase for the applicability of LBM in engineering wind energy flows. Whilst not adding a turbulent flow case to this paper should not prevent its publication, it diminishes its scientific potential. Additionally, the conclusion is missing some detail on the future flow cases to be investigated and the exact challenges in modelling ABL flows.

Please find more detailed line-by-line comments attached.

Please also note the supplement to this comment:
https://www.wind-energ-sci-discuss.net/wes-2019-94/wes-2019-94-RC1-supplement.pdf

Interactive comment on Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2019-94, 2019.