

EGU21-10683

<https://doi.org/10.5194/egusphere-egu21-10683>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## Comparison of Mann Turbulence and atmospheric turbulence as inflow conditions on a wind turbine in large-eddy simulations (LES)

Linus Wrba and Antonia Englberger

German Aerospace Center, Institute of Atmospheric Physics, Oberpfaffenhofen, Germany (linus.wrba@dlr.de)

This study deals with different inflow conditions on wind-turbines in LES in order to analyse the impact on the wake. The wind turbine regarded in this study has a hub height of 57.19 m while the radius of the blade measures 40m. Furthermore, the blade element momentum method (BEM) is used to calculate the development forces of the wind turbine blades on the flow. First, the synthetically generated turbulence of a Mann[1] box generator is considered. Second, atmospheric boundary layer simulations from Englberger and Dörnbrack (2018) are applied as inflow conditions for the three wind components and the potential temperature to calculate the wake of the wind turbine. The distribution of turbulent kinetic energy in eddys of different sizes is worked out in their energy spectrum. The inflow conditions represent the  $-5/3$  Kolmogorov spectrum. The wake characteristics are evaluated for both inflow datasets and the arising differences are discussed in this study

[1] Mann, J. (1994). The spatial structure of neutral atmospheric surface-layer turbulence. Journal of fluid mechanics 273