

Review of *Evolution of Eddy Viscosity in the Wake of a Wind Turbine, R1* by Ryan Scott et al.

Reviewer: M. Paul van der Laan, DTU Wind Energy

February 7, 2023

I would like to thank the authors for their answers and revised article. The authors have mostly responded correctly to my comments and I only have a few remaining comments regarding the revised text:

Main comments

1. The response to Comments 1 and 5 is not correct. Page 2, Line 38: You have added *Alternatively, constant eddy viscosities can be modeled with a scalar function tuned to the turbulent production and dissipation of calibration flow (van der Laan et al., 2015)*. This work does not consider a constant eddy viscosity as your text suggests. Instead, the standard k - ε model definition of the eddy viscosity, $\nu_T = C_\mu k^2 / \varepsilon$, is multiplied by a variable scalar function, f_P : $\nu_T = f_P C_\mu k^2 / \varepsilon$. This f_P function acts as a turbulence length scale limiter in the near wake; the resulting eddy viscosity is a three dimensional scalar variable.
2. The LES case description is more clear now. The only two things I am still missing is the ambient turbulence intensity (based on TKE) at hub height for each turbine case and the value of the applied roughness length at the ground.

Minor comments

1. Page 8 , Line 177: The revised derivation of the analytic eddy viscosity is more clear now, but it still contains a wrong reference to an equation. You write: *A is determined by performing a scale analysis on the eddy viscosity hypothesis in which each component of Eq. (2) is written in terms of their respective units.* I think Eq. (2) should be Eq. (3).

References