Review of *The curled wake model: A three-dimensional and extremely fast steady-state wake solver for wind plant flows*, version R1, by Luis A Martínez-Tossas et al.

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The authors have responded correctly to most of my comments, and they have revised article accordingly. The article can be published as it is but it could be further improved following the remaining comments that I have listed below, all related to the C parameter.

1. The main remaining discussion point where I disagree with the authors is about the usage of the additional constant C in the eddy-viscosity of the mixing length model. It is simply not a free parameter and it can be absorbed in the mixing length parameter to obtain an effect maximum turbulence length scale and von Kármán constant, as shown in the previous review. If the authors prefer to keep using the redundant C parameter, then I strongly suggest that you add a sentence to clarify that the constant C can also be absorbed in the mixing length parameter, but you prefer to use it differently. I am quite sure that experienced readers of your article would have similar thoughts about the C parameter.

   I suspect that the authors have been inspired by a two equation model like the k-ε model, where a C_μ coefficient/ constant exists in the eddy-viscosity relation ($\nu_T = C_\mu k^2/\varepsilon$). However, C_μ cannot be absorbed into another existing parameter in the k-ε model and it is therefore an independent coefficient. For example, if one would absord the C_μ coefficient in the k-equation by defining a new k: $k_{\mathrm{eff}} = \sqrt{C_\mu}k$. Then it would remain in an k_{eff}-equation as a factor of the source terms ($\sqrt{C_\mu}\,(\mathcal{P} - \varepsilon)$). In addition, a $\sqrt{C_\mu}$ factor would show up in the ε-equation, but this could be replaced by effective $C_{\varepsilon,1}$ and $C_{\varepsilon,2}$ coefficients ($C_{\varepsilon,1,\mathrm{eff}} = C_{\varepsilon,1}\sqrt{C_\mu}$ and $C_{\varepsilon,2,\mathrm{eff}} = C_{\varepsilon,2}\sqrt{C_\mu}$.

2. You have added that the following in Section 2.2: *The constant C is used to account for the additional turbulence introduced by the rotor and the wake.* However, one would expect a lower mixing (or turbulence length scale) in the near wake compared to the atmospheric mixing (at least for neutral conditions), which is exactly what a modified k-ε model as the k-ε-f_P model is designed to do, as shown in van der Laan et al. (2015), and further clarified in van der Laan and Andersen (2018) for other modified k-ε models. The value of the maximum length scale of the free atmosphere is quite low (15 m) and would correspond to stable conditions. Note that this maximum length scale can also be interpreted as a proxy for an ABL height, see for example van der Laan et al. (2020). Blackadar (1962) used $\lambda = 0.00027G/f_c$ to model neutral conditions, which would be nearly twice as large as your chosen value, since $\lambda = 0.00027 \times 10/10^{-4} = 27$ m for typical values of the geostrophic wind speed G and the Coriolis parameter f_c. In other words, you could have chosen a higher value of λ and then remove C (or set $C = 1$).

References

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