Reviewer 1

Thank you for the review. We apologize if the article was unclear. There appears to be a misunderstanding about the proposed tip loss correction. We propose to compute the tangential loading according to Equation (6) to take into account the rotation of the resulting force due to the increasing induction towards the tip. This can be understood as an induced drag effect. Treating the tangential loading in this way adds some physics to the modeling of the tip loss effect without needing any additional parameters. Instead the effect of tip loss on the tangential loading follows directly from the axial loading. This requires a good match of the axial loading.

To obtain an improved match of the axial loading we introduced the expression in Equation (7) of the article. This Equation is not based on physics but purely on curve fitting. We do not propose to employ this Equation as a tip loss correction. Instead we only use it to show that the proposed method in Equation (6) will correctly modify the tangential loading if the axial forces agree to a reference.

We will adapt the article to better include the above explanations. We will also remove the 'actuator line' reference from the title of the article. Applying a tip loss method on actuator line methods is a controversial topic that will need some more detailed studies in the future.

A simple improvement of a tip loss model for actuator disc and actuator line simulations This paper presents a possible improvement for Shen's tip loss correction which takes into account tangential induction.

- *This is a misunderstanding. We take into account the effect of the axial induction on the tangential forces. Tangential induction is not mentioned in the article.*

The idea is interesting, however the explanations, derivations and results in the manuscript are unclear. The manuscript is also missing many important details. The following suggestions should be addressed before the manuscript can be considered for publication in WES.

It is difficult to assess the validity of the correction presented when it is only compared to another tip loss correction (Wilson and Lissaman). There is no physical insight for why the new correction has a term "h".

- *There seems to be a misunderstanding. The tip loss correction we present consists of Equations (5) and (6), not of Equation (7). Equation (7), that includes the term 'h' is only used to obtain a good fit of axial and tangential forces for comparison purposes. We apologize if this was not made clear in the original submission. We will clarify this in the revised version of the article.*

A description of the actuator disk model is missing.

- *The description of the CFD method is in Section 4.3. The listed references Réthoré and Sørensen (2012), and Réthoré et al. (2014) describe the actuator disk method in more detail.*

Actuator line model is mentioned but it is never used? I doubt that this correction would work on the actuator line model because it does not take into account the part of the tip vortex that is resolved. It seems the model will only work if there is no resolved tip vortex at all.

- *Actuator line models do need tip corrections because the tip vortex is not fully resolved. Only for a weak tip vortex and a very fine grid resolution one could choose to not use a tip correction. Shen's tip correction is used for actuator line models in:*
  - *Wimshurst, A. and Willden, R. H. J.: Analysis of a tip correction factor for horizontal axis turbines, Wind Energy, 20, 1515-1528, DOI: 10.1002/we.2106*
  - *Breton, S. P., Shen, W. Z., and Ivanell, S. (2017). Validation of the actuator disc and actuator line techniques for yawed rotor flows using the New Mexico experimental data. Journal of Physics: Conference Series, 854, [012005]. DOI: 10.1088/1742-6596/854/1/012005*

Derivation: The derivation presented is not clear. I do not see how equation 5 comes from equations 3 and 4.

- *Here is the full derivation: The last part of Equation (3) in the article is:*

$$L_{2D} = \frac{\rho c}{2} v_{rel}^2 \frac{\partial C_L}{\partial \alpha} (\alpha - \alpha_0) \tag{0.1}$$

Equation (4) in the article:

$$F_{N,3D} \approx F_1 L_{2D} \approx \frac{\rho c}{2} v_{rel}^2 \frac{\partial C_L}{\partial \alpha} (\alpha - \Delta\alpha - \alpha_0) \tag{0.2}$$

Inserting Eq. (0.1) in Eq. (0.2):

$$F_1 \frac{\rho c}{2} v_{rel}^2 \frac{\partial C_L}{\partial \alpha} (\alpha - \alpha_0) \approx \frac{\rho c}{2} v_{rel}^2 \frac{\partial C_L}{\partial \alpha} (\alpha - \Delta\alpha - \alpha_0) \tag{0.3}$$

$$F_1 (\alpha - \alpha_0) \approx (\alpha - \Delta\alpha - \alpha_0) \tag{0.4}$$

$$\Delta\alpha \approx (\alpha - \alpha_0)(1 - F_1) \tag{0.5}$$

This sentence is unclear: "The change in inflow angle is identical with dalpha"

- *It means $\Delta\varphi = \Delta\alpha$. We will add that equation in parentheses after the sentence.*

Table 1: Use the same number of significant digits.

- *We have now used two significant digits for all percentages.*

Section 5.2 – This section is unclear. What is the difference between all these corrections, and which one should be used? All the results are quite different. What is the reference? Are results supposed to match the reference?

- *We will change the legend in the figures so that they state 'Reference: HAWC2 BEM'. We will remove the last line in Figure 5 (F_1^{Test}: F_n + F_t fit:) where we fit the axial and tangential forces independently, because it is confusing and not necessary for the conclusions of the article. We have extended the descriptions of the remaining methods:*

  F_1^{Shen}: F_n fit: The tip loss for F_n and F_t is computed using Eq. (2). The parameters are chosen to fit F_n. This corresponds to using Shen's tip loss correction

  F_1^{Test}: F_n fit: The tip loss for F_n and F_t is computed using Eq. (7). The parameters are chosen to fit F_n. The purpose of this to obtain a better agreement of the axial force. This is possible because the 'test' function has an additional parameter.

  F_1^{Shen}: F_n fit + F_t mod: The tip loss for F_n is computed using Eq. (2). F_t is computed using Eq. (6). This means that the modified tip loss correction proposed here is used together with Shen's tip loss correction.

  F_1^{Test}: F_n fit + F_t mod: The tip loss for F_n is computed using Eq. (7). F_t is computed using Eq. (6). Thus the modified tip loss correction is based on a more closely matching axial force. Based on this the quality of the tangential load correction can be investigated with less error progression from the axial load correction.

I'm sure that there is a physical insight to the model presented? Please describe this.

- *The most concise description of the physical basis for the model (Equations (5) and (6)) is found in the conclusions: 'The modeled mechanism is the rotation of the lift force due to the velocity that is induced by the tip vortex.'. The derivation and the more detailed physical reasoning is found in Section 3 of the article.*