

The authors have greatly improved the FWP formulation and the manuscript as a whole. I recommend publication after minor revisions. I appreciate the authors response to all my comments and the changes made to the manuscript. I believe the changes made to the manuscript have made it clearer. I would appreciate clarification on a couple of points prior to publication.

Responses to the comments of Reviewer #1:

We sincerely thank the reviewer for the suggestions and comments that help us improve the quality of our manuscripts.

1. Inflow wind speed in FWP: in Sect. 5.1, the authors propose an inflow wind speed to the turbine $V_{ijk|wt}$ that differs from the horizontal wind speed in the grid cell V_{ijk} . It is not clear how the inflow wind speed $V_{ijk|wt}$ is derived from V_{ijk} . The authors provide a short explanation on why $V_{ijk|wt}$ differs from V_{ijk} in Lines 312-315. Perhaps a flow chart like Fig. 1 in DOI: 10.1175/MWR-D-20-0097.1 comparing the FWP and Fitch WFP might help clarify this point.

Response: That's a good comment. A more detailed explanation is needed to give the reader an idea of what factors influence the change in the inflow wind speed. The largest uncertainty comes from the surface parameterization scheme (module_sf_mynn.F) in the WRF model. The attenuation of the effective wave height by the floating platform leads to changes in a number of variables that together determine the (inflow) wind speed (Figure 1). We have added this in lines 312-315 of the revised manuscript.

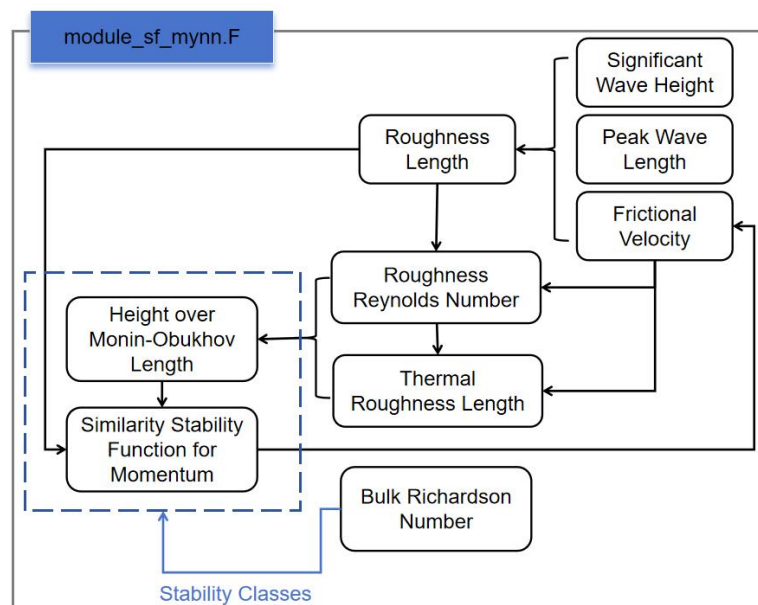


Figure 1. Flowchart of the computation of surface layer variables in the WRF model.

2. Line 295-298: The authors suggest the turbines in the upstream region of the wind farm “absorb” less momentum in the FWP than in the Fitch WFP. However wouldn't the reduced friction velocity from the FWP result in faster winds impacting the turbine? If so, then the turbines would extract more momentum from the wind in the FWP compared to the Fitch WFP. is it possible that the increased drag of the entire

wind farm (increased power extraction) in the FWFP compared to the Fitch WFP produces a stronger blockage effect upstream of the wind farm?

Response: Thank you for your suggestion. It is true that the "the upstream region of the wind farm absorbs less momentum in the FWFP than in the Fitch WFP" is not quite correct. We have made modifications in lines 294-295 of the revised manuscript. 93.2% of the turbines have a lower power prediction for the Fitch scheme than for the FWFP scheme. In fact, it is very likely that this is because the FWFP takes into account that the frictional velocity is lower (the inflow wind speed is higher). The results for the upstream turbines are likely due to stronger blockage effects, but the area affected is small.

We thank you again for giving us an opportunity to revise this manuscript, and look forward to hearing from you.

I appreciate the authors revising their scheme to take into account my concerns and redoing the experiments. The new results seem reasonable, and I think the manuscript is almost there. However, I just have a few hopefully minor concerns:

Responses to the comments of Reviewer #2:

We sincerely thank the reviewer for the suggestions and comments that help us improve the quality of our manuscripts.

1) Section 5.1: A little more explanation of these equations / references might be good. What is C_P in equation 26? What is '|wt'? Isn't (23) just a rearrangement of (22)? Can you explicitly state what the change relative to Fitch is? (I think just $V|_{wt}$ which comes from machine learning surface layer with SWAN inputs?)

Response: Thank you for your suggestion. In section 5.1, we add relevant content. C_P in Equation (26) is the power coefficient. $V_{ijk|wt}$ is the recalculated inflow wind speed at the wind turbine site. Equation (23) is actually a rearrangement of equation (22), which makes it clearer to modify the momentum tendency term in the wind farm parameterization. In the Fitch wind farm parameterization (module_wind_fitch.F), only the inflow wind speed ($V_{ijk|wt}$) is changed.

2) Figure 13 caption, lines 305-315, Figure 16 caption: when you mention differences and their sign, please indicate the order of subtraction of the two terms.

Response: Thank you for your suggestion. We have modified the caption for these two figures.

3) Figure 12, 14, 15: please indicate in the cross sections which end is 'upstream'.

Response: Thank you for your suggestion. We have made changes to the three figures.

4) Conclusion: When you discuss the relative differences between Fitch and FWFP, I would first mention the downstream differences, because in general those are substantially larger than the upstream differences.

Response: That's a good comment. We have made modifications in lines 413-414 of the revised manuscript. We first described the downstream differences.

5) Conclusion, throughout: if you can provide it, it would be nice to have a concise statement of how the expected impact of floating wind turbines on waves (I think, a reduction of SWH and roughness), which is the prime innovation of your scheme, leads to your modeled sensitivities on power production (more power than in default scheme, along with less wind speeds downstream).

Response: That's a good comment. We have added a corresponding statement in lines 415-416 of the revised manuscript. 93.2% of the turbines have a lower power prediction for the Fitch scheme than for the FWFP scheme. In fact, it is very likely that this is because the FWFP takes into account that the frictional velocity is lower (the inflow wind speed is higher).

6) *Last sentence of conclusion: 'In order to better evaluate the power output of floating wind farms and their impacts on the environment, it is necessary to improve the offshore wind farms parameterization.' Can you give just a few reasons why you conclude this?*

Response: That's a good comment. The difference in power output between fixed (Fitch scheme) and floating (FWFP scheme) offshore wind farms is already apparent. Taking into account the attenuation of the significant wave height by the floating platform, the difference in power output can reach 12% on average. The difference in environmental impact is likely to be much smaller. We decided to remove this sentence because it could be misleading.

7) *Though the grammar and clarity are improved, a further technical edit could be used.*

Response: Thank you for your suggestion. We have carefully checked the whole manuscript and made necessary technical corrections.

Thank you again for your great comment.