

Specific comments:

Abstract & Introduction

- 1) “Higher fidelity models broaden the design space...” – did you mean broaden the **feasible** design space?
- 2) “lead to more efficient platform designs” and “this can result in less efficient designs” – efficient in which way(s)? Seems imprecise/vague, clarify if possible.
- 3) “enables the simultaneous variation of design variables across interacting subsystems and thus accounts for coupled physical phenomena” – accounting for variation of design variables across subsystems is not sufficient to account for coupled physical phenomena – disciplinary analysis submodels enable it.
- 4) “optimized and tuned” – please clarify whether it is the platform being optimized and controlled tuned, or somehow both optimized and tuned.
- 5) “particularly for interactions between aeroelastic and control interactions” – repetition
- 6) “especially in some of the dynamic conditions” – vague
- 7) “comes with very little overhead” – did you mean computational cost overhead?
- 8) “comparison of model fidelity levels included in QBlade within CCD optimization problems” – what does it mean to compare fidelities within optimization? Might be worth rewording.

Section 2.1

- 1) “to ensure that resonant frequencies to not coincide with operational conditions.” – we can only talk about resonant frequencies about a pair of frequencies – did you mean natural frequencies?
- 2) “enhances the design process” – vague
- 3) Good high-level definition of CCD, however, could be useful to give an idea of how the controller and other subsystems design variables are being handled within the CCD problems, and example of which variables are typically included; this can help the readers appreciate the curse of dimensionality and why the traditional approach has been to handle the subsystems separately, or where the challenge lies.

Sections 2.1-2.4

- 1) “It has been validated and benchmarked” – verified, if against other codes and not experiments.
- 2) “In contrast, WEIS includes” – in contrast to what? Also, is the fact that WEIS has an option of a linear frequency-domain model relevant to this work? The next statement seems irrelevant too. This section could be streamlined for better readability.
- 3) “In order to obtain the equivalent beam parameters required for the Timoshenko-FPM beam model (i.e. the off-diagonal stiffness and inertia values),...” – Good to explain what Timoshenko-FPM beam model is first.
- 4) “the fatigue loads at various design relevant channels of an onshore turbine” – what are various design relevant channels?
- 5) “In (Papi et al., 2024), the authors confirmed similar findings...” – would be good to elaborate on why the authors concluded that lifting line leads to better designs. What about the method/results led to it? Under/overprediction of which response led to what kind of conservatism in design?

- 6) “the wake method largely differs in the way of how the wake-induced velocities are calculated.” – did you mean “**methods**”?
- 7) “The bound vorticity of the blade is found by iteratively solving the Kutta-Joukowski theorem using estimates from 2D airfoil theory” – could be explained more clearly
- 8) Equation 1: what is the star symbol? What is the lower case c?
- 9) “Problems like these are referred to as $O(N^2)$ problems.” – could be better to explicitly refer to problem complexity
- 10) Might be beneficial to give an idea of the computational cost in absolute terms: how long does it take to run a typical simulation? Also comparing between the different method introduced in this section, to better motivate the possible driver for using lower-fidelity models.
- 11) Modal reduction may need more explaining, as it seems to be one of the critical distinctions between the models considered here.
- 12) The last sentence of the section mentions the paper of Papi on impact of structural model fidelity on blade optimisation. Would be good to use it to position this work: how it expands on this previous research (because it seems to be a natural extension of it).
- 13) General comment: a figure or a table comparing the different models would be useful.

Section 3

- 1) “In practice, the exchange of information between these tools is limited to high-level data” – vague.
- 2) When talking about the platform and controller usually designed separately, it might be worth to look into the literature. Since 2020 multiple papers have done multidisciplinary co-optimisation of the platform, tower and controller; A more thorough reference to MDAO for FOWTs research could be useful to set the background (rather than just referring to the review paper).
- 3) “all five optimizations” – these have not been defined yet?
- 4) “To reduce the influence of transients, the initial conditions were set to an 11 m surge displacement and a 1° platform pitch angle.” – which environmental conditions does this refer to?
- 5) The 10 wind speed bind do not include the rated wind speed at which the turbine will spend most of its operational time. Does that impact the results/discussion in any significant way?

Section 4

- 1) Figure 7 is not introduced in the text.
- 2) Would it be better to split Figure 8 into two? It is confusing to have the two sets of subfigures with different x-axes.
- 3) “increasing aeroelastic fidelity improves not only the accuracy of load prediction but also enables more effective optimization” – this could only be stated if the initial and final designs resulting from each of 5 optimizations were evaluated with one consistent model – otherwise, it is impossible to compare which optimisation led to a better design.

- 4) The caption of Figure 8 should state that the 4 lower subplots are related to the optimised design.
- 5) “The platform mass of the initial iteration was set as a constraint” – how was the initial iteration design chosen then? Do you refer to the starting point, or the design after 1 pass through the optimisation loop?
- 6) “Figure 10 presents a selected subset of the constraints that were set for the optimization problem” – this wording is unclear, could imply that only a subset of constraints were considered in optimisation, please rephrase.
- 7) “The first combination, which constrains the torsional degree of freedom, represents the fidelity level provided by OpenFAST combined with ElastoDyn — the current state of the art in WEIS. This analysis is followed by a discussion...” – this reads as if only the first combination was to be presented, followed by the LCOE optimisation. Consider rewording.
- 8) The 3P region response seems to be relatively unaffected by the optimisation (in relation to Figure 11 and the corresponding discussion). Would including tower flexibility change anything in that respect?

Section 4.3

- 1) Would be good to include a table similar to Table 2b for clarity.
- 2) May be worth noting/discussing that the DEL minimisation did not clearly impact the draft, while LCOE minimisation did.

Conclusion/general comments

- 1) How would the results compare to the case where blades elastically is ignored altogether? There is a lot of literature on FOWT optimisation with rigid body assumptions, and answering this question would be helpful in assessing these as well as recommending future directions.