

Wind Energ. Sci. Discuss., author comment AC2
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Reply on RC2

Masaru Kitahara and Takeshi Ishihara

Author comment on "Seismic soil–structure interaction analysis of wind turbine support structures using augmented complex mode superposition response spectrum method" by Masaru Kitahara and Takeshi Ishihara, Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2021-81-AC2>, 2022

We would like to thank the reviewer for his/her comments and the time dedicated reviewing the manuscript. We have taken into account all the queries and requests from the reviewer. The individual responses to each comment are as follows.

- Considering the reviewer's comment, in the revised manuscript, the authors will divide Section 2 into two distinct sections, and the newly proposed augmented complex mode superposition RSM will be derived in the latter section. This section comprises two subsections, and the former introduces the existing complex mode superposition RSM while the latter focuses on clarifying the novelty of the proposed method. The main novelty is three folds: (i) Maximum seismic loadings, i.e., shear forces and bending moments, of the multi-DOF system are newly derived based on the framework of the complex mode superposition RSM. (ii) An empirical formula of the modal damping ratios is proposed based on a parametric study varying the damping ratio $< 1\%$ to $> 50\%$, in order to address the underestimation of shear forces acting on the footings. (iii) Additional loadings caused by the mass moment inertia of rotor and nacelle assembly and p-delta effect are newly derived based on the framework of the complex mode superposition RSM.
- As described above, the authors will divide Section 2 into two distinct sections. The former containing the current subsections 2.1 and 2.2 keeps the current title "Wind turbine support structures under earthquake", while the latter introducing the proposed method is named as "Augmented complex mode superposition RSM".
- Thank you for raising this. The authors will correct these spelling mistakes in the revised manuscript.
- In this study, the contribution of the p-delta effect on the bending moments acting on wind turbine support structures are considered as an additional loading by the proposed formula, Eq. (19).
- As mentioned above, Eq. (19) is not applied on the structural damping but on estimating the contribution of the p-delta effect on the bending moments acting on wind turbine support structures.
- As stated in the line 213, the first mode damping ratio of 0.2% is computed by Eq. (16), which is derived in Oh and Ishihara (2018) based on several experiments on onshore and offshore wind turbines with different rated powers.