

## ***Interactive comment on “Constructing Fast and Representative Analytical Models of Wind Turbine Main-Bearings” by James Stirling et al.***

**Anonymous Referee #1**

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### **General**

The authors present a manuscript that deals with the calculation of main bearing reaction forces, based on previous work. They show in a very qualified way how simple approaches can also be used in the wind community. As in previous publications of the authors, the realistic wind conditions, which are used for the calculations, should be emphasized. The manuscript is well organized and written but needs major revisions in both the theoretical and practical areas.

### **Specific comments**

- **The presented results are not repeatable.** Concerns arise about the used stiffness values and the practical relevance of the paper. For the FE-models,  
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stiffness values from ROMAX are used, but not named. The authors should give all numbers (including stiffness's,  $L_1$  and  $L_2$ ). Furthermore, the dimensions of the used bearing design are interesting for the reader. Since the main shaft will affect the FE-simulations as well, more details are needed.

- The paper compares a single main bearing system with a SRB and a TRB. It is needless to say, that different bearings need different design of the system and will have different stiffness values. The authors choose an equal design and equal values for SRB and TRB. More and detailed information are needed and a better visualization would be beneficial. The system in Figure 1 shows an axial spring, what does this spring represent?
- The simulation model needs more explanations as well. It is not clear how the shaft affects the results. The description of the manuscript is not appropriate enough to understand the results in detail.
- Implementing a torsional stiffness for the TRB seems reasonable. Nevertheless, the new approach will only deliver satisfying results, when the stiffness values from FE-simulations are given. This raises the question of the benefits of the new approach, since a simulation model is needed anyhow. Here the authors should show the benefits of the approach more clearly. It would nice to see a few examples with varying stiffness's, to see the impact.
- The authors use realistic load conditions, which makes the manuscript particularly interesting for the wind community. However, since models are compared, simple load cases, which for example only consist of a moment or a certain load, should be additionally used. This provides information about the behavior, which is not clearly explained in the current manuscript (this also increases repeatability).

### **Technical corrections**

- In general, the introduction uses grey literature and does not show the state of the art of wind turbine main bearings. The authors should heavily improve this part of the manuscript and should focus on peer-reviewed literature instead of grey literature. Especially, the statement in line 65-68 is not supported by the grey literature (YAGI and SMALLEY) and by the previous work (HART), and should be changed appropriate.
- The Figures of the RMSE and Reaction Force are well organized. Nevertheless, in Figure 4 and 6 it is recommended to use equal values for the axis for a) and b).

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