

Manuscript Title: Investigating Grease Behaviour in Tilted Double-Row Tapered Roller Bearing Installed in Wind Turbine by Developing a Full Scale Multi-Phase CFD Model

Journal: Wind Energy Science

Responses to Comments from Reviewer 3

Referee Comment:

It's critical to provide experimental data substantiating the findings from the simulations to render the method as valid.

Author Response:

In response to the reviewer's comment and in order to further strengthen the manuscript, additional experiments were conducted using the custom-designed test rig at the MEGT, RPTU Kaiserslautern, Germany. A 32224-XL tapered roller bearing (TRB) was used for the experimental investigation. Although this bearing differs in size from the wind turbine main bearing considered in the primary study, the same CFD model, grease properties, and mathematical formulation were employed to ensure methodological consistency and to validate the numerical approach.

The experiments were carried out with a grease filling ratio of 25% of the total bearing free volume at a rotational speed of 500 rpm. Corresponding CFD simulations were performed under the same experimental conditions exploiting the solver settings of the main simulations. The experimental and numerical results of this validation study have been included in Section 2.6. The comparison demonstrates strong agreement between the two approaches, thereby supporting the validity of the proposed CFD model.