WIND ENERGY SCIENCE DISCUSSIONS

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Interactive comment on "Augmented Kalman filter with a reduced mechanical model to estimate tower loads on an onshore wind turbine: a digital twin concept" *by* Emmanuel Branlard et al.

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The subject is relevant and important, namely the estimation of turbine loads in real time. It is generally considered true that manufacturers are aiming to make their turbines smarter and this includes such technology. However, the abstract mentions real-time fatigue life consumption specifically, and it is this reviewer's opinion that no one needs to know fatigue life consumption in real-time. Perhaps other uses of real-time load estimation could help readers see the importance of the work.

The method is broadly applicable, to most turbine types onshore, with a discussion about the future offshore. The techniques used are explained well and are well under-

stood by engineers in this field. The validation method is good and honest - too often signal estimation is claimed to absurd accuracy. The conclusions accurately represent the body of the work.

The language used is appropriate, not being too heavy on mathematics that only mathematicians would know. Important areas of nuance and difficulty are expounded, rather than glossed over, which is refreshing. The paper could be shorter, but possibly at the expense of reproducibility by future readers. The references are relevant and cover the field reasonably well. It could be said that there are interesting load estimators that do not require KF, but perhaps the author wants to focus only on KF.

Proofreading notes: * Line 18 "Wind turbines are designed and optimized for a given site" - or are they designed to a class definition? * Line 42 has a citation to "M." - unless this is James Bond's boss, this might be a Latex error. * Line 49 talks about fatigue life consumption of "turbine components" - there is a huge variety in methods of FLC, so since this paper is only about rainflow counting for the tower, perhaps reword this to be less overreaching? * Line 55 makes it sound like thrust is all you need for the loads up the tower. Isn't rotor asymmetric loading from e.g. shear more significant as you go up the tower? * Line 160 inline equation X_{x_d} I think should be $X_{x,d}$. * Line 186 "where \rho" should be after equation (13) not (14) * Line 199 another citation error to WG3? * Line 355 previously you have amounts of time in the main text, not math mode so this time constant of 1s looks odd with the s italic.

Interactive comment on Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2020-55, 2020.