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Interactive comment on "Implementation of the Blade Element Momentum Model on a Polar Grid and its Aeroelastic Load Impact" *by* Helge Aagaard Madsen et al.

Anonymous Referee #2

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Very nice paper that justly stresses the importance of BEM implementations. Some comments and suggestions to further improve the paper:

-The paper points out differences between 'conventional' BEM (solving the equations for a whole annulus) and the grid based BEM implementation. Several of the aeroelastic codes mentioned in the intro make use of a local BEM approach, where the BEM equations are solved separately per blade using local flow conditions as input. Can the authors point out the difference of their implementation with respect to this more current BEM implementation, e.g. what differences can we expect in sheared and turbulent inflow?

-Section 3.4 page 10 The explanation on the grid based BEM is based on a 3-bladed rotor. What would be the approach for a 2-bladed rotor?

-Section 3.9 and Algorithm 1 The different time scales between dynamic stall and dynamic inflow effects are considered to justify the separate calculation of these effects rather than solve them in an integral fashion. Perhaps it is good to clarify whether the modification in lift due to dynamic stall effects still has an influence on the calculated induction and if so how? From the algorithm it appears the Beddoes Leishman dynamic arfoil data is calculated after the induction calculation, is that corrrect? And similarly, are the dynamic inflow and yaw correction applied in the BEM iterative loop for convergence or applied separately after that?

-Figure 16. To improve readability it is suggested to indicate in the figures (e.g. by adding a title, although it is indicated in the caption) what the difference is between the 2 plots?

-Section 4.3 page 25 line 500 It is mentioned that when operating in high thrust coefficients and non-uniform inflow conditions (e.g. shear), the local induced velocity can increase when the local wind speed decreases due to the high thrust coefficient and the corresponding slope in the Ct-a curve. As a consequence the fatigue seems to increase when the described local grid based BEM approach is used. Is it expected that this will physically occur as well (i.e. an increasing induced velocity for a decreasing inflow speed)? Has this effect been validated/verified against higher fidelity codes (e.g. CFD/vortex)?

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