Remaining Life Assessment of Offshore Wind Turbines subject to Curtailment - DTU Orbit (30/12/2018)

The fatigue damage reduction versus energy production loss trade-off analysis is demonstrated on a Vestas V-52 turbine by de-rating the turbine power over a specific period corresponding to high measured turbulence using a spinner mounted anemometer. Based on the measured blade root and tower base loads, the benefit of curtailment under high turbulence on lowering the fatigue damage is quantified. A cut-off mean turbulence intensity level of 16% at 15m/s or class-A conditions is chosen as the turbulence level to impact tower base fatigue damage reduction. The turbulence is measured using a spinner anemometer mounted on the V-52. It is shown that the tower base foreaft damage equivalent moments can at some mean wind speeds be reduced by as much as 30%. The reduction in the blade root damage equivalent moment is not significant for power set point based curtailment. The learnings from this power curtailment strategy based on measured turbulence are extended to an offshore wind farm study case to demonstrate its benefit to life extension or CAPEX reduction of offshore sub structures.

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