Aeroelastic Optimization of a 10 MW Wind Turbine Blade with Active Trailing Edge Flaps

This article presents the aeroelastic optimization of a 10MW wind turbine ‘smart blade’ equipped with active trailing edge flaps. The multi-disciplinary wind turbine analysis and optimization tool HawtOpt2 is utilized, which is based on the open-source framework Open-MDAO. The tool interfaces to several state-of-the art simulation codes, allowing for a wide variety of problem formulations and combinations of models. A simultaneous aerodynamic and structural optimization of a 10 MW wind turbine rotor is carried out with respect to material layups and outer shape. Active trailing edge flaps are integrated in the design taking into account their achieved fatigue load reduction. The optimized ‘smart blade’ design is compared to an aeroelastically optimized design with no flaps and the baseline design.

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Contributors: Barlas, A., Tibaldi, C., Zahle, F., Aagaard Madsen , H.
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