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ACTIVE AERODYNAMIC BLADE CONTROL DESIGN FOR LOAD REDUCTION ON LARGE WIND TURBINES

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ABSTRACT

Through numerical simulations that use trailing edge flaps as active aerodynamic load control devices on wind turbines that range from 0.6MW-5MW rated power, a 20-32% reduction in blade root flap bending moments was achieved. This allows the turbine blade lengths to be increased, without exceeding original fatigue damage on the system, resulting in larger swept rotor area. This study developed and simulated several independent flap control designs (including tip deflection and tip rate deflection feedback) that seamlessly integrated with existing pitch control strategies to reduce loads sufficiently to allow 10% rotor extension and increased energy capture (see reference [1] for methodology).