Active Control of Wind Turbines Through Varying Blade Tip Sweep

In this research work an introduction to the concept of an actively controlled horizontal axis wind turbine through varying blade tip sweep, is presented. The concept refers to variable tip swept rotor blades, that have the ability to pivot collectively aft, about an axis located at the blade tips. Quantities to be controlled are power production and blade loads. The investigation is carried out with a modified Blade Element Momentum (BEM) model that takes into account variable tip swept rotor blades and the modifications are based on results from a lifting line theory based model. The simulations refer to the 5MW NREL reference wind turbine that incorporates a suitable controller and preliminary results show beneficial behaviour in all of the investigated areas.

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