

Wind Turbine Pitch Optimization

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- [Proceedings MSC paper](#)

We consider a static wind model for a three-bladed, horizontal-axis, pitch-controlled wind turbine. When placed in a wind field, the turbine experiences several mechanical loads, which generate power but also create structural fatigue. We address the problem of finding blade pitch profiles for maximizing power production while simultaneously minimizing fatigue loads. In this paper, we show how this problem can be approximately solved using convex optimization. When there is full knowledge of the wind field, numerical simulations show that force and torque RMS variation can be reduced by over 96% compared to any constant pitch profile while sacrificing at most 7% of the maximum attainable output power. Using iterative learning, we show that very similar performance can be achieved by using only load measurements, with no knowledge of the wind field or wind turbine model.

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