Iterative feedback tuning of wind turbine controllers

Traditionally, wind turbine controllers are designed using first-principles, linearized, or identified models. The aim of this paper is to show that with an automated, online and model-free tuning strategy, wind turbine control performance can be significantly increased. To this purpose, Iterative Feedback Tuning (IFT) is applied to two different turbine controllers: drivetrain damping and collective pitch control. The results, obtained by high-fidelity simulations using the NREL 5MW wind turbine, indicate significant performance improvements over baseline controllers which were designed using classical loop-shaping techniques. It is concluded that iterative feedback tuning of turbine controllers can potentially become a valuable tool to improve wind turbine performance.