Coordinated Pitch & Torque Control of Large-Scale Wind Turbine Based on Pareto Efficiency Analysis - DTU Orbit (04/10/2019)

For the existing pitch and torque control of the wind turbine generator system (WTGS), further development on coordinated control is necessary to improve effectiveness for practical applications. In this paper, the WTGS is modeled as a coupling combination of two subsystems: the generator torque control subsystem and blade pitch control subsystem. Then, the pole positions in each control subsystem are adjusted coordinately to evaluate the controller participation and used as the objective of optimization. A two-level parameters-controllers coordinated optimization scheme is proposed and applied to optimize the controller coordination based on the Pareto optimization theory. Three solutions are obtained through optimization, which includes the optimal torque solution, optimal power solution, and satisfactory solution. Detailed comparisons evaluate the performance of the three selected solutions and provide the optimized controller coordination suggestions according to different requirements.

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