Genetic Algorithm Optimization of PID Pitch Angle Controller for a 2 MW Wind Turbine

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Speed regulation of wind turbine rotors are controlled by pitch angle controllers that affect the life expectancy of wind turbines, reliability and power quality. Optimization of wind turbine pitch angle controllers perform crucial effect on the wind turbine dynamics where the speed stability is achieved. In today's modern and commercial wind turbines, blade pitch angle controllers are generally implemented with PI and PID techniques. Determining the controller gain coefficients are one of the most significant problems in order to show a more stable rotor dynamics that eventually leads to better wind turbine performance in terms of both mechanical and electrical qualities. Hence, PID controller was designed and optimized with genetic algorithm technique for a 2 MW DFIG type wind turbine under Matlab-Simulink environment. Gain parameters were optimized for a given wind speed profile from third zone and optimized gain coefficients were achieved within the optimization study. A controller with an optimum gain coefficients shows the superior performance than the regular PID performance.

Keywords: Genetic Algorithm, Pitch Angle Controller, Speed Regulation, Wind Energy.

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