Design of a wind turbine pitch angle controller for power system stabilisation

The design of a PID pitch angle controller for a fixed speed active-stall wind turbine, using the root locus method is described in this paper. The purpose of this controller is to enable an active-stall wind turbine to perform power system stabilisation. For the purpose of controller design, the transfer function of the wind turbine is derived from the wind turbine's step response. The performance of this controller is tested by simulation, where the wind turbine model with its pitch angle controller is connected to a power system model. The power system model employed here is a realistic model of the North European power system. A short circuit fault on a busbar close to the wind turbine generator is simulated, and the dynamic responses of the system with and without the power system stabilisation of the wind turbines are presented. Simulations show that in most operating points the pitch controller can effectively contribute to power system stabilisation.

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