

Adaptive Nonlinear Control of a Variable Speed Horizontal Axis Wind Turbine: Controller for Optimal Power Capture

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Abstract : This article introduces a solution for increasing the wind energy extracted from turbines to overcome the more electric power required. This objective provides a new science discipline; wind turbine control. This field depends on the development in power electronics to provide new control strategies for turbines. Those strategies should deal with all turbine operating modes. Here there are two control strategies developed for variable speed horizontal axis wind turbine for rated and over rated wind speed regions. These strategies will support wind energy validation, decrease manufacturing overhead cost. Here nonlinear adaptive method was used to design speed controllers to a scheme for 'Aeolos50 kw' wind turbine connected to permanent magnet generator via a gear box which was built on MATLAB/Simulink. These controllers apply maximum power point tracking concept to guarantee goal achievement. Procedures were carried to test both controllers efficiency. The results had been shown that the developed controllers are acceptable and this can be easily declared from simulation results.

Keywords : adaptive method, pitch controller, wind energy, nonlinear control

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