

Sliding Mode Control of Variable Speed Wind Energy Conversion Systems

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Abstract : Wind energy has many advantages, it does not pollute and it is an inexhaustible source. However, its high cost is a major constraint, especially on the less windy sites. The purpose of wind energy systems is to maximize energy efficiency, and extract maximum power from the wind speed. In other words, having a power coefficient is maximum and therefore the maximum power point tracking. In this case, the MPPT control becomes important. To realize this control, strategy conventional proportional and integral (PI) controller is usually used. However, this strategy cannot achieve better performance. This paper proposes a robust control of a turbine which optimizes its production, that is improve the quality and energy efficiency, namely, a strategy of sliding mode control. The proposed sliding mode control strategy presents attractive features such as robustness to parametric uncertainties of the turbine; the proposed sliding mode control approach has been simulated on three-blade wind turbine. The simulation result under Matlab\Simulink has validated the performance of the proposed MPPT strategy.

Keywords : wind turbine, maximum power point tracking, sliding mode, energy conversion systems

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