

High Order Sliding Mode for Direct Torque Control of DFIG-based Wind Turbine with a Storage Unit

Elhadj Bounadja*, Zinelaabidine Boudjema and Abdelkader Djahbar
Department of Electrical Engineering, University Hassiba Benbouali, Algeria

Doubly-fed induction generator (DFIG) wind turbine has been extensively used in wind energy conversion system due to its fine energy capture performance, good controllability and simple implementation. In this paper, we examine a non linear control based on the high order sliding mode (HOSMC) for the direct torque control (DTC) of a DFIG incorporated in a wind energy conversion system and associated with a storage unit. This research is carried out to reach two main objectives. Firstly, the DFIG rotor side converter is controlled by HOSMC-DTC in order to achieve good performances. The second objective is the association a storage unit, in parallel with the DC bus, to obtain a smooth as much as possible the power supplied to the network grid. Finally, the simulation results showed that DFIG wind turbine with storage unit could provide a much smoother power output at different wind conditions comparing with the conventional DFIG wind turbine.

Keywords-Component; Doubly Fed Induction Generator (DFIG); Direct Torque Control (DTC); High Order Sliding Mode Controller (HOSMC); Storage unit.