Energy Procedia

Volume 74, Issue 2015, 2015, Pages 211-225

Adaptive Fuzzy Gain Scheduling of PI Controller for control of theWind Energy Conversion Systems

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Abstract: In this work, the Wind Energy Conversion Systems (WECS) based on doubly fed induction generator (DFIG) model is built.First, we consider the vector control strategy of the active and reactive powers in order to ensure an optimum operation. Thewhole system is presented in d-q-synchronous reference frame. After, the design of Adaptive Fuzzy Gain Scheduling ofProportional Integral Controller (AFGPI) for WECS is described, where the optimization by Fuzzy rules is utilized online toadjust the parameters of PI controller based on the error and its first derivative. Finally, the control of the active and reactivepower using fuzzy-PI controller is simulated using software Matlab/Simulink, studies on a 1.5 MW DFIG wind generationsystem compared with conventional proportional integral controller. Performance and robustness results obtained are presentedand analyzed.

Keywords : wind systems, doubly fed induction generator, fuzzy control, fuzzy gain scheduling control, fuzzy PI control, PI controller.