

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

Khouloud BEDOUD, Mahieddine Ali-rachedi, Tahar Bahi, Rabah Lakel

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. The whole system is presented in d-q-synchronous reference frame. After, the design of Adaptive Fuzzy Gain Scheduling of Proportional Integral Controller (AFGPI) for WECS is described, where the optimization by Fuzzy rules is utilized online to adjust the parameters of PI controller based on the error and its first derivative. Finally, the control of the active and reactive power using fuzzy-PI controller is simulated using software Matlab/Simulink, studies on a 1.5 MW DFIG wind generation system compared with conventional proportional integral controller. Performance and robustness results obtained are presented and analyzed.

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