Transactions on Electrical and Electronic Materials

Volume 19, Issue 2, 2018, Pages 146-156

Robust Fuzzy On–Off Synthesis Controller for Maximum Power Point Tracking of Wind Energy Conversion

Sami KAHLA, Moussa Sedraoui, Mohcene Bechouat, Youcef Soufi

Abstract: Due to the major discrepancy between the exigent demands regarding the electrical energy quality and the irregular nature of the wind, which is characterized by random and instantaneous speed variations, it is vital to determine the optimal operating point that maximizes the efficiency of the obtained electrical energy in the grid from wing generators. The present paper addressed the above-mentioned problem by introducing a fuzzy logic control system in the standard on–off control strategy. The purpose is to maximize the power point tracking of wind energy and to reduce the mechanical loads in which variable wind speed is considered. This idea has the ability to drive the conversion system to its optimal operating point, thereby solving the switching component problem (also referred to as the chattering problem) of the standard on–off control strategy. To examine the validity of the proposed idea, the obtained results are compared with those given by the standard on–off control strategy wherein our method can ensure a better dynamic behavior of the wind energy conversion system.

Keywords : Wind Energy Conversion System (WECS), Maximum Power Point Tracking (MPPT), Standard and fuzzy on–off controller, Induction generator (IG)