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Optimal nonlinear control of DFIG wind turbine system based artificial bee colony algorithm

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Abstract

This paper focuses on meta-heuristic optimization techniques that are presently employed to enhance a variety of problems. While there are different types of MOTs, the method discussed in this work concentrates primarily on the artificial bee colony (ABC). This research investigates an optimal feedback linearization control (FLC) for a doubly fed induction generator's (DFIG) active and reactive powers regulation.This study aims to overcome the limitations of the conventional tuning method by proposing an algorithm that generates gains for the PI controller. The proposed control strategy is validated using MATLAB SIMULINK with a 1.5 MW DFIG wind turbine. Simulation results demonstrate that optimal feedback linearization control significantly improves performance compared to conventional feedback linearization control, as evidenced by reduced overshoot, steady-state error, and settling time.

Keywords: Wind energy conversion system, Nonlinear control, optimization techniques, Artificial bee colony.
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