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Artificial neural network control doubly fed induction generator based wind power system

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ABSTRACT

Renewable energy sources (RES) are playing a vital role in fulfilling the future energy needs of the world. The modern power system architecture, which is power electronics based, entails numerous non-linear loads and distributed generations (RESs), resulting in the development of several PQ issues. This project proposes an Artificial Neural robust control method for a DFIG based wind energy conversion system. To reduce the chattering phenomena in the excitation system, advance controller system is employed for the adaptive adjustment of the discontinuous control gain while preserving the robustness of the closed-loop system. At first, the modelling of the turbine and the DFIG will be presented. Then, while using the proposed ANN controller, the rotor magnitudes are adjusted to accomplish vector control of the active and reactive power. The converter's goal is to operate at unity power factor and provide input currents with a tolerable harmonic content. At the interface between the powers electronic converter and the double fed induction generator (DFIG), extract the most real power possible. Finally, to validate the proposed controls, we will conduct a series of numerical simulations using MATLAB 2021a /Simulink software.

KEY WORDS: Wind System, DFIG, Power Transfer Matrix and ANN Controller

1. INTRODUCTION:

The electrical power generated by the wind system is one of the most reliable, efficient and developed renewable energy sources. The Doubly Fed Induction Generator is operated by a wind turbine with variable-speed variable-pitch control scheme. This system can be operated either grid connected mode or stand-alone mode. In present scenario the design of the wind turbine power plants is mainly depends on the DFIG technology. This a DFIG-based wind-power/storage system can deliver a specified amount of power to the grid, despite wind power fluctuations.

DFIG has two different control schemes stator flux reference frame used by for Rotor side control (RSC) is one and current reference frame used by Grid side control (GSC) is another to provide the firing pulses to the converters.