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DYNAMIC MODEL AND CONTROL OF DFIG WIND ENERGY SYSTEMS BASED ON POWER TRANSFER MATRIX USING SVPWM

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ABSTRACT

This project proposes a power transfer matrix model and multivariable control method for a doubly-fed induction generator (DFIG) wind energy system using Svpwm (space vector pulse width modulation). The power transfer matrix model uses instantaneous real/reactive power components as the system state variables. The power transfer matrix model improves the robustness of controllers as the power wave forms are independent of a *dq* frameofre ference. The design controller includes six compensators for capturing the maximum wind power and supplying there quired reactive power to the DFIG. A power/current limiting scheme is also presented to protect power converters during a fault. The validity and performance of the proposed modeling and control approaches are investigated using a study system consisting of a grid-connected DFIG wind energy conversion system. This investigation uses the time-domain simulation of the study system to: 1) validate the presented model and its assumptions, 2) show the tracking and disturbance rejection capabilities of the designed control system, and 3) test the robustness of the designed controller to the uncertainties of the model parameters.

KEYWORDS: Doubly Fed Induction Generator (DFIG), Dynamics Modeling, Instantaneous Power, Multivariable Control, Wind Energy Systems, Wind Power Control, Wind Turbine Generator