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Comparative Performance Analysis between Linear, Robust and Intelligent DPC Strategies Applied to Doubly Fed Induction Machine

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This work gives an investigation on the decoupled power control and the robustness capabilities of the doubly-fed induction machine (DFIM) against the rotational speed variation and machine parameters variations.

The ability of DFIM to operate in motoring and generating modes, sub and super-synchronous modes are tested by direct control of the stator active and reactive powers using three different control laws. The first one is a field oriented control (FOC), then the nonlinear sliding mode control (SMC) approach, and finally the intelligent fuzzy logic control (FLC) law.

Simulation results obtained on a 1.5MW machine connected to the electrical grid are provided for each control law. A comparison study has been given in order to clarify the straight and weakness points of each control law in four-quadrant operating modes.

Keywords: DFIG, FOC, SMC, FLC, robustness.

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