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Fault Diagnosis of an Induction Generator ina Wind Energy Conversion System Using SignalProcessing Techniques

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Abstract: In this article, a contribution to fault diagnosis of an in-duction machine in a wind energy conversion system in closed-loopoperation using a combination between short-time Fourier transformand discrete wavelet transform algorithms is proposed. An on-linefault diagnostic technique based on stator currents analysis of thesquirrel-cage induction generator is proposed to detect and localizeabnormal electrical conditions that indicate, or may lead to, a statoror rotor failure in a squirrel-cage induction generator. This techniquealso permits identification of a fault severity factor and consequentlyhelps to determine the best choice of correctivemaintenance. Further-more, a generalized model of the squirrel-cage induction generatoris used to simulate both the rotor and stator faults, taking iron losses,main flux, and cross-flux saturation into account. The efficiency ofdiagnostic procedure in closed-loop operation of the wind energyconversion system under non-stationary operating conditions is illus-trated with simulation results.

Keywords : fault diagnosis;, Induction Generator;, Wind Energy Conversion System;, Signal Processing Techniques