

Fault Diagnosis of an Induction Generator in a Wind Energy Conversion System Using Signal Processing Techniques

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Abstract: In this article, a contribution to fault diagnosis of an induction machine in a wind energy conversion system in closed-loop operation using a combination between short-time Fourier transform and discrete wavelet transform algorithms is proposed. An on-line fault diagnostic technique based on stator currents analysis of the squirrel-cage induction generator is proposed to detect and localize abnormal electrical conditions that indicate, or may lead to, a stator or rotor failure in a squirrel-cage induction generator. This technique also permits identification of a fault severity factor and consequently helps to determine the best choice of corrective maintenance. Further-more, a generalized model of the squirrel-cage induction generator is used to simulate both the rotor and stator faults, taking iron losses, main flux, and cross-flux saturation into account. The efficiency of diagnostic procedure in closed-loop operation of the wind energy conversion system under non-stationary operating conditions is illustrated with simulation results.

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