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电力系统仿真及分析计算

小波熵证据的信息融合在电力系统故障诊断中的应用

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摘要

电力系统中快速准确的故障诊断是事故后隔离故障元件、恢复系统正常运行的首要前提，具有重要意义。该文从信息融合的角度出发，提出利用多种小波熵测度的融合来解决电力系统故障诊断问题。小波熵测度由于结合了小波变换和信息熵理论的优势，能快速准确地提取线路故障特征，但由于故障的不确定性和多样性，依靠单一的小波熵测度诊断故障可能出现诊断困难或诊断失真等问题，因此提出采用D-S证据理论对多种小波熵进行信息融合，并采用范数加权平均的方法来建立基本可信度分配，以基本可信数的决策方法来实现故障模式诊断。基于EMTDC和Matlab的仿真证明，该方法能提高对故障诊断结果的支持度及故障诊断的准确性和实时性，是故障模式定量诊断的一种可行性新方法。

关键词 故障诊断 信息融合 小波熵 证据理论 基本可信度分配

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Information Fusion Method of Entropy Evidences and Its Application to Fault Diagnosis in Power System

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Abstract

Fast and exact fault diagnosis is principal precondition of isolating faulty components and restoring power system, so it is of great importance. Starting from theory of information fusion, this paper put forwards the fusion of several different wavelet entropies and put it into application to fault diagnosis in power system. Wavelet entropy can pick up the fault characteristic quickly and exactly because it combines together the advantages of Wavelet Transform and Shannon Entropy; but fault diagnosis based only on single wavelet entropy may cause difficult or inaccurate results because of the uncertainty and diversity of faults. Therefore, several different wavelet entropies are fused by the D-S evidence theory and the basic probability assignment is set up by a weighted average method based on norm, then a decision-making method based on the basic probability number is used to diagnose the faults. Simulations with EMTDC and Matlab prove that this diagnosis method can increase support strength and can improve the accuracy and the real-time performance of fault diagnosis in power system, so it is a feasible method for fault diagnosis in quantification.

Key words fault diagnosis information fusion wavelet entropy evidential reasoning basic probability assignment

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