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一种检测电力变压器局放信号的离散小波算法

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摘要: 大型电力变压器经常发生局部放电现象, 必将导致绝缘层破坏, 停电事故发生甚至变压器解体, 因此, 必须在线检测局部放电信号。作者分析了可能存在的各种干扰源及其特征(包括干扰源频率的分布范围), 讨论了各种干扰源进入检测系统的3种途径并提出了相应的抑制措施, 设计了用于计算机模拟的局放检测信号。针对高频的局放信号, 提出了一种改进型快速小波变换分解及重构算法, 对仿真的局部放电信号进行了分解与重构。该算法对低频信号具有较低的频率分辨率, 而对高频信号具有较高的频率分辨率。仿真结果表明, 改进的快速小波变换分解与重构方法能有效地滤除强载波干扰, 不失真地提取出局部放电信号幅值及其放电时间。

关键字: 小波变换; 电力变压器; 脉冲; 信号

A discrete wavelet transform method for detecting the partial discharge pulse in HV transformer

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Abstract: The partial discharge happens frequently in HV power transformer, which causes huge loss to economy and people's life. Detecting partial discharge has very important significance. In this paper, we analyze all sorts of disturbances and their characters (including frequency scope of disturbance signal, for example frequency of power carried signal is from 40 k to 500 kHz), and then conclude that the disturbance waves are pulse waves and strong carried waves of different frequency. Three approaches of disturbance to the partial discharge are discussed in order to eliminate all disturbances. The signals for simulating the two kinds of different partial discharge signals and the disturbed partial discharge signal in HV transformer are designed. In order to extract the partial discharge pulse from strong carried disturbances, a modified fast discretewavelet algorithm is proposed based on discrete wavelet transformation theory, which has low resolving power to the low frequency signal, but has high resolving power to the high frequency signal. Simulation results show that it can eliminate the strong carried disturbances and detect the time position and amplitude of the partial discharge signals.

Key words: discrete wavelet transformation; HV transformer; pulse; signal

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