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自动化

基于分布参数模型的高压输电线路单相接地故障单端测距方法

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摘要：

由于分布电容和过渡电阻的影响，现有单端阻抗法无法适用于高压输电线路单端故障测距。针对这一问题，采用分布参数模型建模，定义了参考位置操作电压计算式。分别给出了相位法定位函数和幅值法定位函数，经理论分析可知：当参考点位置位于故障点左侧或右侧时，电压定位函数具有不同的相位特性，其在故障点前后会发生唯一一次阶跃性突变；而所取的参考点与故障点重合时，电压定位函数幅值达到最小。在此基础上提出了适用于高压输电线路单相接地故障的单端相位测距法和单端幅值测距法。仿真结果表明，这2种方法受故障位置、过渡电阻和负荷电流的影响很小，高阻接地故障时依然具有很高的测距精度，因此都能够满足现场的应用要求。

关键词： 高压输电线路 分布参数 故障测距 单端信息

One-Terminal Fault Location of Single-Phase to Earth Fault Based on Distributed Parameter Model of HV Transmission Line

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Abstract:

Due to the existence of distributed capacitance and transition resistance in HV transmission lines, existing fault location methods based on one-terminal impedance are not suitable for the one-terminal fault location of HV transmission lines. To solve this problem, a transmission line model based on distributed parameters is built and the calculation formula for operation voltage at reference position is defined. A location function based on phase characteristics and a location function based on amplitude characteristics, which utilize one-terminal data, are given. It is known from theoretical analysis that the voltage loaction function possesses different phase characteristics while the selected reference position is located at the left side or the right side of the faulty point, i.e., an only step abrupt change of the phase characteristic occurs while the reference position moves through the fault point, and when the selected reference position coincides with faulty point, the amplitude of votlage location function reaches its minimum. On this basis a one-terminal phase-based fault location method and a one-terminal amplitude-based fault location method for the fault location of single-phase earth fault of HV transmission line are proposed. Simulation results show that the two proposed fault location method are slightly affected by fault position, transition resistance and load current, their fault location results are accurate for high-resistance earth-fault , thus they can meet the requirement of on-site application.

Keywords: HV transmission line distributed parameter fault location one-terminal data

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