

光伏并网中随过渡电阻倾斜角变化的自适应距离保护策略与PSCAD仿真 【上架时间： 2023-03-30】



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【标题】 光伏并网中随过渡电阻倾斜角变化的自适应距离保护策略与PSCAD仿真

【Title】 Adaptive distance protection strategy and PSCAD simulation varying with the inclination angle of transition resistance in photovoltaic grid connection

【摘要】 三段式距离保护受过度电阻的影响在光伏电站并入的110kV网络中尤为明显，导致光伏并网的110kV系统中线路距离保护动作正确率不高。原因在于过渡电阻的倾斜角在光强发生变化时会随之变化[1]，引起较大误差。本文通过仿真可以发现传统的距离保护在光伏并网经较大过渡电阻接地时，其精度误差可以达到19%。为解决该问题，本文提出一种光伏并网中随过渡电阻倾斜角变化的自适应距离保护策略。首先，通过故障分量分析过渡电阻的倾斜角完全由光伏电站等效阻抗决定。其次，找到光伏电站等效阻抗与其发电量之间存在一定函数关系。再次，找到与之间的关系后，获得因过渡电阻倾斜角变化引起的测量阻抗误差与光伏电站发电量之间的关系。最后，通过这个关系给出距离保护动作的新判据，指导线路三段式距离保护动作。本文通过PSCAD仿真分析，随过渡电阻倾斜角变化的自适应距离保护算法在各种工况下的仿真结果误差精度明显高于传统的距离保护算法，并且随着光伏处理P越大，故障点越接近保护安装处，过渡电阻越大，自适应距离保护算法的优势越明显。

【Abstract】 The influence of excessive resistance on three-stage distance protection is particularly obvious in the 110kV network incorporated by photovoltaic power stations, resulting in the low accuracy of line distance protection action in the 110kV system of photovoltaic grid connection. The reason is that the tilt angle of the transition resistance will change when the light intensity changes, causing large errors. Through simulation, it can be found that the accuracy error of traditional distance protection can reach 19% when photovoltaic grid connected is grounded through a large transition resistance. To solve this problem, this paper proposes an adaptive distance protection strategy that changes with the tilt angle of transition resistance in photovoltaic grid connection. First, through the fault component analysis, the inclination angle of the transition resistance is completely determined by the equivalent impedance of the photovoltaic power station. Secondly, it is found that there is a certain functional relationship between the equivalent impedance of photovoltaic power station and its power generation. Thirdly, after finding the relationship between and, the relationship between the measurement impedance error caused by the change of transition resistance inclination angle and the power generation of photovoltaic power station is obtained. Finally, through this relationship, a new criterion of distance protection action is given to guide the action of three-stage distance protection. Through PSCAD simulation analysis, the error accuracy of the simulation results of the adaptive distance protection algorithm that changes with the inclination angle of the transition resistance under various working conditions is significantly higher than that of the traditional distance protection algorithm, and with the larger PV processing P, the closer the fault point is to the protection installation, the larger the transition resistance is, the more obvious the advantage of the adaptive distance protection algorithm is.

【关键词】 光伏并网；三段式距离保护；过渡电阻倾斜角；PSCAD仿真

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