

An Adaptive Hybrid Approach for Protection of Transmission Line Compensated with UPFC

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Abstract

The presence of flexible ac transmission system (FACTS) controllers in transmission lines causes mal-operation of distance relays. The series-shunt FACTS devices have larger influence on the performance of the relays compare to the other FACTS controllers. Furthermore, high-resistance fault is another factor that relay become under-reach and cannot correctly identify the fault. In this paper, a method is provided based on synchrophasors to eliminate the effects of unified power-flow controller (UPFC) and fault resistance on the distance relay. In the presented method, the data of voltage and current signals of buses will be sent to system protection center (SPC). In SPC, an algorithm is provided based on active power calculation in buses which is able to eliminate the effects of both mentioned factors. The main advantage of the proposed method, in addition to the simplicity of the algorithm, is the ability to operate in all types of faults and in high-resistance faults. Furthermore, a technique is presented in this paper to calculate UPFC data. A comparison has been performed between this technique and another method where UPFC data is directly transmitted to SPC by communication channel. In modeling of UPFC, detail model is used based on 48-pulses voltage source converters.

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