

Artificial neural network application in coordination of directional overcurrent protective relays in electrical mesh distribution network

ABSTRACT

Directional Overcurrent relays (DOCR) applications in meshed distribution network (MDN) eliminate short circuit fault current flow due to the system topological structure. Effective and reliable coordination between primary and secondary relay pairs eliminated miscoordination in MDN system. Otherwise, the risk of safety of lives and installations may be compromised alongside with system instability. This paper proposes an Artificial Neural Network (ANN) approach to improve the optimized DOCR response time to short circuit fault within the MDN in order to address miscoordination problem due to wrong response time among adjacent DOCRs to the same fault location. A test model series of several DOCRs in simulated IEEE 8-bus test system, designed in DigSilent Power Factory. Extracted data from three phase short circuit fault analysis, applied in numerical optimization of time setting multiplier (TSM), plug setting multiplier (PSM) and operation time of DOCRs. These data adapted in function fitting training of ANN to determine an improved optimal operation time of DOCRs in general network.

Keyword: Artificial neural networks; Directional overcurrent relay; Meshed distribution networks