ABSTRACT

The objective of this work is to contribute to the development of a technique based on intelligent systems that allows the accurate location of the Short Duration Voltage Variations (SDVV) origin point in an electrical power distribution system. The employed database was made using simulations of a model of radial feeder using the PSCAD / EMTDC program. Once the fault is detected via a Phase-Locked Loop (PLL), voltage signals acquired during the fault are decomposed into instantaneous symmetrical components by the proposed method. Then, the energy of the symmetrical components is calculated and used to estimate the fault location. In this work, two systems based on Artificial Neural Networks (ANN) are evaluated. The first one is designed to classify the fault location in one of the possible points and the second one is designed to estimate the fault distance from the feeder. The technique proposed herein applies to three-phase feeders with balanced loads. In addition, it is considered that there is availability of voltage measurements in the initial node of the feeder and also in sparse points along the distribution power grid. In both neural network architectures, sensitivity tests are performed in order to verify the reliability of the results. Furthermore, in order to check the generalization capability of the neural networks, tests with faults not originally contained in the database were performed. The performances of both architectures of neural networks were satisfactory and they demonstrate the feasibility of the proposed techniques to perform fault location on generic grids.

Key-Words: Artificial neural network, Short Duration Voltage Variations (SDVV), phase-locked loop, PLL, Electrical Power Distribution System, PSCAD/EMTDC.