ABSTRACT

More and more consumers of electric energy have demanded a service of better quality and greater reliability. Thus the operation of distribution systems has become even more complex, leading to the implementation of advanced functions for the automation of such systems.

These functions require a real-time, accurate, reliable database, from which it is possible to supervise a given area of interest for the operation. This database is built through an advanced function known as State Estimation, responsible for processing a redundant set of measurements, so as to obtain an estimate of the system operating state, for a given network configuration.

For economic reasons, the number of telemetered measurements integrated to the data acquisition system in distribution networks generally is not redundant enough for the execution of the State Estimation function. However, through the combination of a minimum plan of measurements and the use of pseudomeasurements adequately chosen, it is possible to make available an input data set, which allows the accomplishment of the estimation process with adequate reliability.

This Dissertation presents a methodology to deal with the meter placement problem for distribution system monitoring through the State Estimation function. The proposed methodology refers to the definition of measurement points (considering type, location and number of meters) which: leads to reliable estimates of the system operating state; allows the monitoring of the network as a whole; presents a minimum cost. The optimization technique used to treat the problem was the Genetic Algorithms due to its flexibility and simplicity of implementation. Numerical results of simulation studies with the proposed methodology applied to typical test systems are presented and discussed.