

A sensitivities computation method for reconfiguration of radial networks

A. González García; F.M. Echavarren Cerezo; L. Rouco Rodríguez; T. Gómez San Román

Abstract-

Distribution networks are operated in a radial configuration, but their topology, especially in urban areas, is normally meshed in order to improve reliability of supply. This makes it possible to configure the network after a power outage to restore the service to affected customers by alternative ways of supply. Distribution operation and planning decisions usually involve network reconfiguration studies. Network reconfiguration entails changing the state of network switches to redistribute loads among feeders in order to restore service or minimize losses or alleviate overloads or voltages out of limits. The switching operation is the basic control action in network reconfiguration. A switching operation consists of closing the switch in an opened branch and opening the switch in a closed one, keeping the network configuration radial. As a consequence, the computation of sensitivities of the state variables with respect to switching operations is a useful resource for predicting the changes in a network during a reconfiguration process. This paper presents a method for computing the sensitivities of the state variables with respect to switching operations and obtaining estimations of voltages and power flows in the network. The proposed method not only provides accurate estimations, but also implies low computation load. To illustrate the performance of the developed method, a 16 bus test system and a real scenario of the 15 kV Madrid distribution system were analyzed. For both cases, the bus voltages and the feeder power flows were estimated and compared with the power flow solution. In addition, an analysis of the computation load is presented.

Index Terms- distribution networks, network reconfiguration, switching operation, sensitivity analysis.

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If your institution has an electronic subscription to IEEE Transactions on Power Systems, you can download the paper from the journal website:

[Access to the Journal website](#)

Citation:

González, A.; Echavarren, F.M.; Rouco, L.; Gómez, T. "A sensitivities computation method for reconfiguration of radial networks", IEEE Transactions on Power Systems, vol.27, no.3, pp.1294-1301, August, 2012.