

ABSTRACT

In this thesis a comprehensive analysis on reactive power compensation, fuzzy power flow and fuzzy load balancing using the concept of fuzzy set theory for radial distribution network is presented.

Chapter-1 introduces the various aspects of distribution system in general and presents a survey of the past work concerning reactive power compensation of radial distribution network and application of fuzzy set theory to various problems of distribution system. It clearly lays down the objectives and motivations of the research work presented in the thesis.

Chapter-2 presents a fuzzy reasoning approach based on power loss index and node voltages for suitable location of shunt capacitors. After obtaining the suitable location, genetic algorithm (GA) is used for obtaining the optimum values of fixed and switched type of capacitors. Another feature of this algorithm is that the shunt capacitors and their costs are treated as discrete variables. The effectiveness of the proposed method is demonstrated through two examples.

Chapter-3 presents application of fuzzy set theory for load current estimation. After estimating the fuzzy load currents, fuzzy branch currents are computed. Voltages at every node are directly computed using the simple relation of receiving end and sending end voltages. Analysis reveals that branch currents, node voltages and power losses are always lying in the closed intervals. Effectiveness of the proposed algorithm is demonstrated through examples.

Chapter-4 presents application of fuzzy set theory to radial distribution networks for load balancing. Load balancing are performed between laterals and between feeders based on mean value of load current. The proposed concept is based on the fuzzy load current estimation and a membership function is defined for target load transfer between two laterals and two feeders. The proposed method is very effective for load balancing and after load balancing and after load balancing, network will retain it's radial structure. Effectiveness of the proposed method is demonstrated through two examples.

Chapter-5 brings out the significant conclusions of the entire work and the scope for further research.