Abstract

Loss minimization in power system is an important research issue. Transmission line losses in a power system can be minimized by means of reactive power compensation. The continuous demand in electric power system network has caused it to be heavily loaded leading to voltage instability. This phenomenon has also led to voltage profile depreciation below the acceptable secure limit. The significance and use of Flexible AC Transmission Systems (FACTS) devices and capacitor placement is in order to alleviate the voltage profile decay problem. Identification of the optimal value of compensating devices requires proper optimization technique, easy to search the optimal solution with less computational burden. This paper presents an application of Bacterial Foraging (BF) algorithm in optimizing the optimal location and design of Thyristor Controlled Series Capacitor (TCSC) for voltage profile improvement and minimization of losses in a power system which utilized the TCSC as the control variable. The proposed approach has
been evaluated with three different objective functions namely, loss minimization, voltage profile improvement and voltage stability enhancement. Voltage stability level of the system is defined on the L-index of the load buses. The IEEE 14bus and IEEE 30bus systems are used as test systems to demonstrate the applicability and efficiency of the proposed system. The proposed method is compared with Genetic Algorithms (GAs) and Non-dominated Sorting Particle Swarm Optimization (NSPSO). The test result shows that the location of TCSC improves the voltage profile of the system and also minimizes the transmission line losses.

Reference

Bacterial Foraging Algorithm based Enhancement of Voltage Profile and Minimization of Losses Using Thyristor Controlled Series Capacitor (TCSC)


Index Terms

- Power Electronics
- Control Systems

Key words

- Flexible AC Transmission Systems (FACTS)
- Thyristor Controlled Series Capacitor (TCSC)
- Multi-Objective function
- Bacterial Foraging (BF)
- L-index