LC Compensators for Balanced and Unbalanced Harmonics using Genetic Algorithm

by

Khaled Hosny Ibrahiem Shahata

Electrical Power and Machines Department
Fayoum University

A Thesis Submitted to the

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in partial Fulfillment of the

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ABSTRACT

Distortion in electric power networks takes place as a direct result of non-linear nature of electric system. In order to reduce the distortion level, reactive compensation is used. Pure capacitive (C) compensator is suitable for small loads however it fails with large networks in which the distortion level is always high.

Resonance is the main problem of C compensator. Inductive- capacitive (LC) compensator is the best choice for large networks, since the inductive part limits the current at high frequencies resulting in low cost and rating.

This thesis uses the genetic algorithm (GA) as an optimization tool for finding the optimum fixed shunt compensator for load in the power systems, when the source and the load nonlinearities are considered. The procedure is valid for unbalanced condition as well as balanced condition. GA is a search mechanism based on the principle of natural selection and population genetics.

The proposed optimization procedure minimizes the transmission line loss and cost and maximizes the load power factor, the overall efficiency and the saving. Performance of the proposed solution is discussed through numerical examples.

The output results emphasize that LC compensators are more efficient and recommended than C compensators.