

ABSTRACT

The objective of this project is to develop a Static Synchronous Series Compensator (SSSC) controller with the purpose to control the power flow in the transmission lines. The optimal parameters of this controller are sized using an optimization technique so that the transmission line losses can be minimized. SSSC is a part of Flexible AC Transmission System (FACTS) technology that has the ability to control the interrelated parameters that govern the operation of transmission systems. The optimization of the parameters of SSSC is formed as an optimization problem with the objective of minimizing the transmission loss in the power system network. Particle Swarm Optimization (PSO) technique is used to solve the problem and the Newton-Raphson method for power flow is modified to consider the insertion of SSSC in the network. The proposed method is applied using MATLAB and tested on IEEE 14-bus system to observe the voltage profile and the transmission loss of the power system network. This report also covers basic principles and operation of SSSC, the power flow model and PSO technique. The result and outcome of the project are included as well as the recommendation for future work.

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LIST OF SYMBOLS AND ABBREVIATIONS

δ, θ	Phase angle
I	Current
P	Active power
p.u.	per unit
Q	Apparent power
V	Voltage
Y	Admittance
FACTS	Flexible AC Transmission System
IPFC	Interline Power Flow Controller
SSSC	Static Synchronous Series Compensator
UPFC	Unified Power Flow Controller
STATCOM	Static Synchronous Compensator
VSC	Voltage-Source Converter
GA	Genetic Algorithm
PSO	Particle Swarm Optimization