INJECTION OF SHUNT CAPACITOR AND TAP CHANGING TRANSFORMER FOR LOSS MINIMIZATION IN POWER SYSTEM

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ABSTRACT

This project focuses on injection of shunt capacitor and tap-changing transformer for loss minimizations in power system. Fast Voltage Stability Index (FVSI) is used to determine the sensitive bus. To minimize losses, Shunt capacitor and Tap changing transformer are used. When the sensitive bus was chosen, the size of Shunt Capacitor is determined then followed by Tap changing transformer. Finally Shunt Capacitor and Tap changing transformer are combined. An IEEE 6-bus, 9-bus and 30-bus Reliability Test System (RTS) are used for simulation. All simulations were done using MATLAB R2009b.

Keywords - Load Flow (LF), Sensitive Bus, Newton Raphson, Shunt Capacitor (SC), Tap Changing Transformer (TCT), fast voltage stability index (FVSI).

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CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

A power system is an interconnected system composed of generating stations which convert fuel into electricity, substation that distribute power to loads, and transmission lines that tie the generating station and sub stations together. According to voltage levels, an electric power system can be viewed as consisting of a generation system, a transmission system, and distribution system. [1]

Load flow is the solution for the normal balanced three phase steady-states operating conditions of an electric power system. In general load flow calculations are performed for power system planning and operational planning and in connection with system operation and control [1]. Load flow deals with the flow of electrical power from one or more sources to load consuming energy through available paths as commonly shown in the single line diagram. Electric energy flow in a network divides among branches according to their respective impedances until a voltage balance is reached in accordance to Kirchhoff s laws [2].

The losses in electrical network distribution as well as real and reactive power flow for all equipment connecting the buses can be computed by means of load flow simulation [8]. The quantification and minimization of losses is important because it will determine the economic operation of the power