DESIGN AND SIMULATION OF UNIFIED POWER FLOW COMPENSATOIR(UPFC)

ABSTRACT:

This paper presents a control scheme and comprehensive analysis for a unified power flow controller (UPFC). This developed analysis reveals that a conventional power-feedback control scheme makes the UPFC induce power fluctuation in transient states.. A UPFC rated at 10 KVA is designed and constructed, which is a combination of a series device consisting of three single-phase pulse width modulation (PWM) converters and a shunt device consisting of a three phase diode rectifier. Although the dynamics of the shunt device are not included, it is possible to confirm and demonstrate the performance of the series device. Experimental results agree well with both analytical and simulated results and show viability and effectiveness of the proposed control scheme. The focus of this (UPFC),which can provide simultaneous control of basic power system parameters like voltage, impedance and phase angle.

In this work, two simulation models of single machine infinite bus (SMIB) system, i.e. with & without UPFC, have been developed.

These simulation models have been incorporated into MATLAB based Power System Toolbox (PST) for their transient stability analysis. These models were analyzed for three phase fault at different locations, i.e. at the middle and receiving end of the transmission line keeping the location of UPFC fixed at the receiving end of the line. Transient stability was studied with the help of curves of fault current, active & reactive power at receiving end, shunt injected voltage & its

angle and series injected voltage & its angle and excitation voltage. With the addition of UPFC, the magnitude of fault current reduces and oscillations of excitation voltage also reduce. Series and Shunt parts of UPFC provide series and shunt injected voltage at certain different angles. Therefore, it can be concluded that transient stability of SMIB is improved with the addition of Unified Power Flow Controller.