© May 2024 | IJIRT | Volume 10 Issue 12 | ISSN: 2349-6002

Reactive Power Compensation using SVC

Prof. S.S. Shinde[1], Mr. Pravin M Zende[2], Mr. Rutik N Nimgare [3]
[1]HOD, SMSMPITR AKLUJ
[2,3] B Tech Student, SMSMPITR AKLUJ

***Abstract*—The purpose of the project is to improve the power factor of transmission line using static variable compensator. These were insufficient and because of large rotating parts they got damaged quickly. Static VAR Compensation under FACTS uses TSC (Thyristor Switched Capacitors) based on shunt compensation duly controlled from a programmed microcontroller. This proposed system demonstrates power factor compensation using Thyristor switched capacitors. The time lag between the zero voltage pulse and zero current pulse duly generated by suitable operational amplifier circuit in comparator mode are fed to interrupt pins of the 8 bit microcontroller of 8051 family.**

***Index Terms*—SVC (static variable compensator), FACTS (Flexible AC Transmission System), LCD (liquid crystal display).**

I. INTRODUCTION

The FACTS (Flexible AC Transmission System) is a broad term representing the application of power electronics-based solutions to AC power system. FACTS, with ratings from tens to hundreds of Giga watts, have been utilized in the power systems to satisfy the function of achieving better power transferability and enhancing power system controllability with the maturity of manufacturing and development and application of power electronics technology.it is the application of power electronic equipment, with one or multiple functions, to regulate and control the electrical parameters that govern the operation of transmission systems including voltage, current, impedance, phase angle and damping of oscillations.

Energy efficiency topic has become more and more prominent as demand for electrical power grows. This is due to the increased reactive power will further increases the systems loss and reduces the efficiency of the power system.

II. LITERATURE SURVEY

1. Voltage Stability Profile Betterment and Reactive Power Quantity Adjustment with the Assistance of Static VAR" by A Siva Lakshmi, N Aparna, Ch. Pavan Kumar in IJARSET Vol. 6, Special Issue, August 2019. In this paper they discussed about, the impacts of Static VAR Compensator (SVC) on voltage soundness of a power system.The model depends on speaking to the controller as factor impedance those changes with the terminating edge of the TCR.

2. Comparative Analysis of STATCOM and SVC for Reactive Power Enhancement in A Long Transmission Line" by Nunna Sushma in IJCSE Vol.-6, Issue-6, Jun 2018. In this paper they said that, In recent power system scenario, the main concern is about the maximum power transfer capability from generating station to the distribution station.

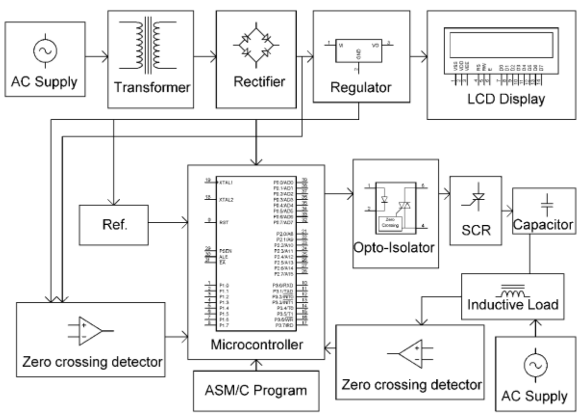
3.Voltage Stability Enhancement by Optimal Placement of UPFC" by M.Kowsalya, K.K.Ray, Udai Shipurkar and Saranathan in Journal of Electrical Engineering & Technology Vol. 4, No. 3, pp. 310~314, 2009. In this paper they said that, the improvement of the voltage profiles of power system networks by the inclusion of Unified Power Flow Controller (UPFC).

4. Improved Harmony Search Algorithm for Optimal Placement and Sizing of Static Var Compensators in Power Systems" by Reza Sirjani & Azah Mohamed in 2011 IEEE. In this paper they said that, Static Var compensator (SVC) is normally used in Power system to improve voltage profile and reduce system Power losses. In this paper, a relatively new optimization Technique named as the improved harmony search algorithm (IHS) is applied to determine optimal location and size of SVC Devices in a transmission network.

III. OBJECTIVE

1.In this project to improve power factor of transmission lines using static variable compensator.
2.This proposed system demonstrates power factor compensation using thyristor switched capacitors
3.The time lag between the zero-voltage pulse and zero current pulse duly generated by suitable operational amplifier circuits
4.Thereafter program takes over to actuate appropriate number of opto-isolators duly interfaced to back-to-back SCRs.

IV. METHODOLOGY



A) Working

This method is used either when charging the transmission line, or, when there is very low load at the receiving end. Due to very low or no load a very low current flows through the transmission line. Shunt capacitance in the transmission line cause Ferranti Effect. The receiving end voltage may become double the sending end voltage (generally in case of very long transmission lines). To compensate, shunt inductors are connected across the transmission line. The lead time between the zero voltage pulse and zero current pulse duly generated by suitable operational amplifier circuits in comparator mode are fed to two interrupt pins of the microcontroller where the program takes over to actuate appropriate number of opto-isolators interfaced to back to back SCRs at its output for bring shunt reactors into the load circuit to get the voltage duly compensated. The microcontroller used in the project is of 8051 family which is of 8 bit. The power supply consists of a step down transformer 230/12V, which steps down the voltage to 12V AC. This is improved to DC using a Bridge rectifier. The ripples are removed using a capacitive filter and it is then regulated to +5V using a voltage regulator 7805 which is required for the operation of the microcontroller and other components.

B) Result & Model

The main aim of this project is to study the AC Transmission system. The 230V supply is given to the circuit and verified the operation of the circuit with switching on the resistive, inductive, and capacitive load which is part of the circuit. During the load switch ON and off verified the time required to maintain the power factor unity in the circuit in each stage of load like resistive, inductive & capacitive load. Our main objective was to create an enhanced circuit that will improve the power factor. The Flexible AC Transmission system achieved by improving the

power factor reduces the output voltage fluctuations providing us with a more efficient and stable transmission system.

C. CONCLUSION

The main aim of this project is to study the AC Transmission system. Our main objective was to create an enhanced circuit that will improve the power factor. The Flexible AC Transmission system achieved by improving the power factor reduces the output voltage fluctuations providing us with a more efficient and stable transmission system. This proposed system increases the power factor by nearing its value to 1 with the help of the capacitor bank in the circuit. Microcontroller based Thyristor driven static variable compensation gives the better results than the conventional types of compensation techniques like synchronous condensers. Due to the usage of Thyristor than the conventional relay circuit makes the whole system free from contact pitting. This will also help to maintain a sustainable future in which we have limited sources of power and limited AC Transmission lines.

REFERENCE

1. International journal of innovative in science, engineering and technology (Electrical power theft detection and wireless meter reading).
2.International journal of innovative research in electrical, electronics, instrumentation and control engineering (Tampering detection of domestic load by GSM).
3.http://www.energyaxis.com/ea-inf- white-papers.asp.
4.Mehta VK, Mehta R. Principles of power system, 4th ed, Chand publication, 2008.
5. Liveira MAO, Barioni CC. Technical loss calculation by distribution system segment with corrections from measurements, Proc. 20th.
6. Hingorani NG, Gyugi L. Understanding FACTS- Concepts and Technology of Flexible AC Transmission System, Standard Publishers & Distributors, IEEE papers, New York.