

STATCOM INTELLIGENT CONTROL STRATEGY FOR REACTIVE POWER COMPENSATION

N.M. Tabatabaei¹ H.A. Shayanfar² A. Mokhtarpour³ S. Shoarinejad⁴ A. Shoarinejad⁴

*1 Electrical Engineering Department, Azarbaijan University of Tarbiat Moallem, Tabriz, Iran
Electrical Engineering Department, Seraj Higher Education Institute, Tabriz, Iran, n.m.tabatabaei@gmail.com*

2 Elect. Eng. Dept., Iran University of Science and Technology, Tehran, Iran, hashayanfar@yahoo.com

3 Elect. Eng. Dept., Islamic Azad University of Tabriz, Tabriz, Iran, a.mokhtarpour@gmail.com

4 Atrak Energy Co., Tehran, Iran, s.shoarinejad@atrakenergy.com, a.shoarinejad@atrakenergy.com

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Abstract- Increasing of industrial and commercial loads as well as concerning that the loads basically have not unity power factor, the active and reactive power transferring from electrical system transmission lines are essentially. It is known that capacity of power system lines are bounded and transmission of electrical power over than is impossible. In this condition, if reactive current flows from power transmission system lines, so capacity of lines for active power transmission will decrease. Another point is that losses in power transmission lines will be increase because of flowing of reactive current over them. So it is important that to measure and control of reactive power in power systems. This paper presents an intelligent measurement and control devices of PowerLogic based STATCOM control strategy for measurement and control of reactive power. It is shown from results that this control strategy increases the ability and performance of compensator. Results also show validity of this strategy of control.

I. INTRODUCTION

Increasing and development of nonlinear and inductive loads and concern that their requirement for reactive power to work; it is needed to produce reactive power along with active power in generators and transfer via transmission lines. Producing of this kind of power in generators will cause many problems in power system. In this condition amount of active power that can be produced by generator will decreased because generator has limit generation capacity. Reactive currents cause loss in lines as well as overloading and saturation of transformers too [1]. Referring to Equation (1), reactive current i_R in going of transmission line will generate thermal losses P_l in transmission line impedance R .

$$P_l = R.i_R^2 \quad (1)$$

This kind of current causes vertical component of voltage and then increases difference of the voltage amplitude between generator and load terminals that has shown in Figure 1. In the other words, the voltage amplitude in Point of Common Coupling (PCC) is decreased that causes inaccurate operation of sensitive loads so control and compensation of reactive power is very important [2].

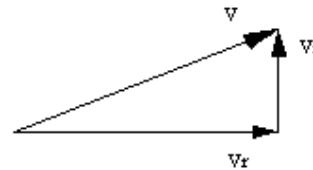


Figure 1. Vector diagram of voltage

We can inject or supply the required reactive power near the loads then all of mentioned problems about reactive power will sell. Many devices imbedded to problems of reactive power control such as capacitor banks or passive filters. But they compensate reactive power in predetermined condition of load and power system; because they are passive and amount of reactive power producible is bounded. Nowadays Flexible AC Transmission Systems (FACTS) have performed revolution in reactive power compensation branch. Because FACTS devices are active and control amplitude and phase of reactive current that should be injected to the grid, have ability for compensating power factor [3, 4]. STATCOM is one of FACTS devices that can be used for compensation and control of power factor. In all of FACTS devices, it is important that the control strategy be suitable to have better and speedily control over power factor compensation. Many control strategies for STATCOM were researched and each of them can improve reactive power and power factor problems [5]. Important criteria in the control strategy are speed and multimode control capabilities. Power systems are