



STATCOM Model against SVC Control Model Performance Analyses Techniques by Matlab

Tariq Masood¹, R.K. Aggarwal¹, S.A. Qureshi², R.A.J Khan³

¹ Department of Electronics and Electrical Engineering, University of Bath, Bath BA2 7AY United Kingdom

² Department of Electrical Engineering, University of Engineering and Technology, Lahore Pakistan

³ Department of Electrical Engineering, Rachna College of Engineering and Technology, Gujranwala Pakistan

P.O Box No. 1000 52 Dukhan Industrial City-State of Qatar, Ph: 00974 560 75 72, Fax: 00974 429 36 16

E-mail: T.Masood@bath.ac.uk OR masood@qp.com.qa

Abstract: Principal objective of this paper is to investigate the behavior of STATCOM against SVC controller by setting up new control parameters. Essentially, STATCOM, and SVC linear operating ranges of the V-I and V-Q as well as their functional compensation capabilities have been addressed to meet operational requirement with certain degree of sustainability and reliability. Hereby, the other operating parameters likewise transient stability, response time, capability to exchange real Power and Power Losses have also been addressed in STATCOM against SVC control models. In addition to that, STATCOM-Controller's pragmatic response has been identified and determined its reliability level to maintain full capacitive output current at low system voltage. Therefore, it indicates that STATCOM device has more effectiveness than the SVC in improving transient stability (first swing).

Key words:

FACTS Devices - Matlab, Measuring Transfer Function - Control Transfer Functions – STATCOM

Introduction: STATCOM is defined by IEEE as a self commutated switching power converter supplied from an appropriate electric energy source and operated to produce a set of adjustable multiphase voltage, which may be coupled to an AC power system for the purpose of exchanging independently controllable real and reactive power. The controlled reactive compensation in electric power system is usually achieved with the variant STATCOM configurations. The STATCOM has been defined as per CIGRE/IEEE with following three operating structural components. First component is **Static:** based on solid state switching devices with no rotating components; second component is **Synchronous:** analogous to an ideal synchronous machine with 3 sinusoidal phase voltages at fundamental frequency; third component is **Compensator:** provided with reactive compensation.[1],[2]

References:-

- [1]. How FACTS controllers benefits AC transmission systems: **John J. Paserba**, Fellow IEEE.
- [2]. How FACTS improve the performance of electrical grid: **Rolf Grunbaum, Ake Petersson, Bjorn Thorvaldsson** (ABB Review 3/2002)
- [3]. Dynamical performance of TCSC schemes: By **Lennart Angquist, Gunnar Ingestrom, Hans-Ake Jonsson** ABB Power system AB Sweden (CIGRE 1996:14-302)
- [4]. Application of STATECOM for damping torsional oscillation in series compensated AC systems: By **K.V Patil, J. Senthil, J.Jiang R.M.Mathur**: IEEE Transactions on energy conversion, Vo.,13 No. 3, September 1998.
- [5]. Selection of passive elements for a three-level inverter based static synchronous compensator: By **J.B. Ekanayake, N.Jenkins**: IEEE Transaction on Power delivery, vol. 14, no 2, April 1999.
- [6]. Modeling STATECOM into power system: **H.F.Wang** University of bath, Bath BA2 7AY, UK.
- [7]. Investigation of voltage regulation stability of static synchronous compensator in power system: **Li chum, Jiang Qirong, Xu Jianxin**. Pg 2642-2647 IEEE-2000
- [8]. Study of a statcom application for voltage stability evaluated by dynamic PV Curves and time simulations: By **Hiroshi Yonezawa, Michiharu Takeda, John j. Paserba**: Pg 1471-1476 IEEE-2000
- [9]. Improved statecom model for power flow analysis: **Zhiping Yang, chen shen, Maresa L. Crow, Lingli Zhang**. Pg 1121-1126 IEEE-2000
- [10]. Application of a 5MVA, 4.16 KV D-statecom system for voltage flicker compensation at seattle iron & metals: **Gregory F.Reed, Masateshi Takeda, Fre Ojima**: pg 1505- 1512 IEEE-2000
- [11]. Harmonics resonance phenomena in statecom and relationship to parameters selection of Passive components: **Shen Dong, Wang Zhonghong, J.Y.Chen, and Y.H.Song**: IEEE Transaction on Power delivery, vol, 16, No. 1, January 2001.
- [12]. The VELCO STATCOM-Based transmission system Project: **Gregory reed, John Paserba, Masatoshi Takeda, Yoshihiro Hamasaki, Lauri Thomas, George Smith**:Pg 1109-115 IEEE-
- [13].2001.