Novelty Journals

ISSN 2394-9678

International Journal of Novel Research in Electrical and Mechanical Engineering
Vol. 2, Issue 1, pp: (47-51), Month: January - April 2015, Available at: www.noveltyjournals.com

Experimental Study of Power Losses in Transmission Line Using UPFC Device

[1]Akanksha Shrivas, [2]Dr. A.K.Sharma, [3]Mr. Ashish Choubey

[1]Research scholar, [2]Professor & HOD, [3]Assistant Professor,

[1]Fourth Semester ME (High Voltage), Jabalpur Engineering College, Jabalpur (M.P) 482011, India

[2,3]Department of Electrical Engineering, Jabalpur Engineering College, Jabalpur (M.P) 482011, India

Abstract: **The flexible Ac transmission system (FACTS) controllers can play an important role in the power system security enhancement. However, due to high capital investment, it is necessary to locate these controllers optimally in the power system. FACTS devices can regulate the active and reactive power control as well as adaptive to voltage-magnitude control simultaneously because of their flexibility and fast control characteristics. Placement of these devices in suitable location can lead to control in line flow and maintain bus voltages in desired level and so improve voltage stability margins. This paper describes the theory and Experimental approach of flexible Alternative Current Transmission Systems (FACTS) devices used in the disturbed power systems. Out of three, one of these devices, Unified Power Flow Controller (UPFC) will be chosen for a specific application, detailed in this paper.**

Keywords: **Voltage Stability, FACTS Devices, UPFC**

1. INTRODUCTION

The power electronic based flexible AC transmission systems (FACTS) have been developed and used as economical and efficient means to control the power transfer in the interconnected AC transmission systems . This allows forcing the power transit in the lines with higher transmission capacity. Among the FACTS components, Unified Power Flow Controller (UPFC), is the most complete. It is able to control independently the throughput active and reactive powers. The UPFC is capable to act over three basic electrical system parameters [4]: line voltage, line impedance, and phase angle, which determine the transmitted power. Power Flow through an alternative current line is a function of the line impedance, the magnitude of the sending-end and receiving-end voltage and the phase angle between these voltages [4]. The power flow can be increased, firstly by decreasing the line impedance with a capacitive reactance, secondly by increasing the voltages and finally by increasing the phase angle between these voltages.

2. EXPERIMENTAL SETUP

The whole experiment of UPFC is done on single phase testing. The circuit consist three phase switch and neutral .Phase selector is used for selecting the phase in which test is performed. Voltage regulator is used to regulate the voltage level and adjust the voltage reading in the voltmeter, Ammeter is used for measuring the current value. The shunt and series transformers is connected with the UPFC circuit, the capacitor is used here is DC type, the output is taken in the display circuit with the help of LED.

Novelty Journals

ISSN 2394-9678

International Journal of Novel Research in Electrical and Mechanical Engineering
Vol. 2, Issue 1, pp: (47-51), Month: January - April 2015, Available at: www.noveltyjournals.com

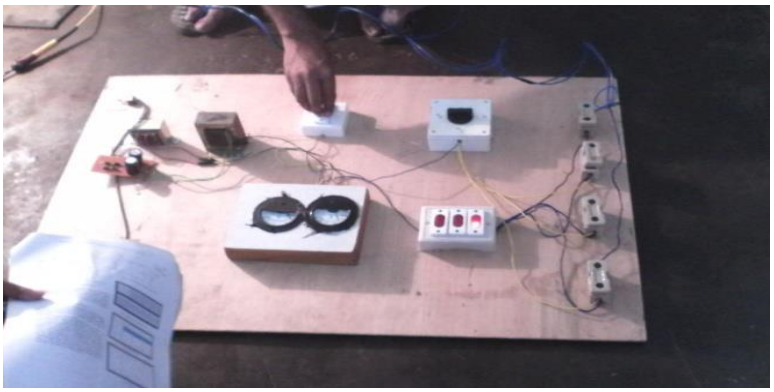

Figure .2.1. Experimental setup

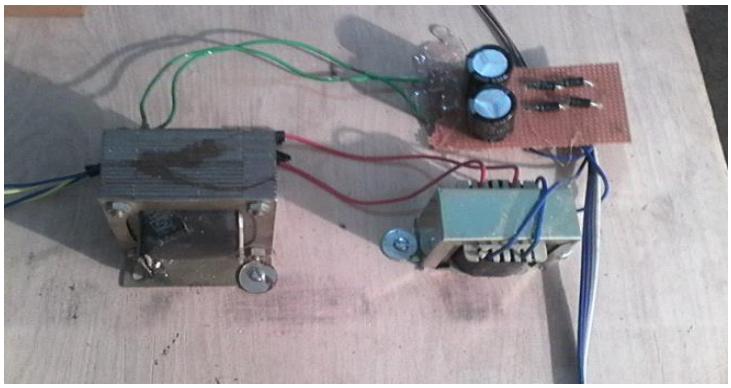

Figure .2.2. series transformer and parallel transformer

Figure.2.3. condenser

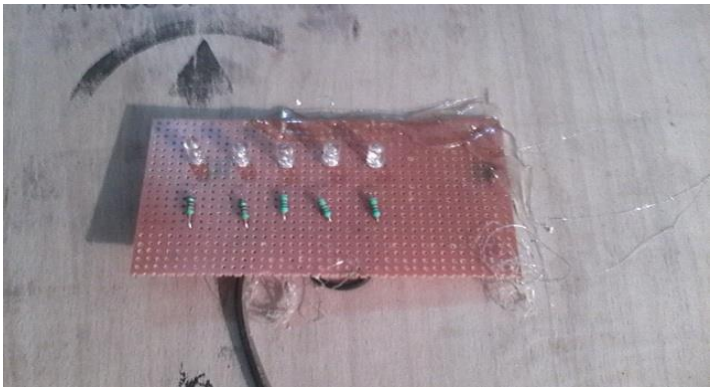

Figure.2.4.display

Novelty Journals

ISSN 2394-9678

International Journal of Novel Research in Electrical and Mechanical Engineering
Vol. 2, Issue 1, pp: (47-51), Month: January - April 2015, Available at: www.noveltyjournals.com

3. RESULTS

3.1-Reading and display without Filter

Novelty Journals

ISSN 2394-9678

International Journal of Novel Research in Electrical and Mechanical Engineering
Vol. 2, Issue 1, pp: (47-51), Month: January - April 2015, Available at: www.noveltyjournals.com

3.2-Reading and display with Filter

Table3.1

Sr. No.	Reading without Filter in Hz	Reading with Filter in Hz
1	50.08 Hz	49.97 Hz

Table 3.2

Sr. No.	Parameter	Reading without Filter	Reading with Filter
1	V_1	235.43 V	235.01 V
2	I_1	59.74ma	62.43ma
3	P_1	11.89 W	12.037 W
4	S_1	14.087 VA	14.694 VA
5	Q_1	8.498Var	8.428 VAR
6	$ø_1$	37.11	35.00

4. CONCLUSION

This paper presents the control & performance of the UPFC used for power quality improvement. Voltage compensation using UPFC are studied. It is found that there is an improvement in the real powers through the transmission line when UPFC is introduced. The UPFC system has the advantages like reduced maintenance and ability to control real powers.

REFERENCES

[1] C.D. Schaulder et al., "Operation of unified power flow controller (UPFC) under practical constraints', IEEE Trans.Power Del., vol.13, no.2. pp. 630-639, Apr1998.

[2] R.Mihalic et al., "Improvement of transient stability using unified power flow controller' IEEE Trans.Power Del., vol. 11, no. 1, pp. 485-492, Jan 1996 .

[3] Machowski et al., Power System Dynamics and Stability. New York: Wiley, 1998.

[4] M. Noroozian et al., " Improving power system dynamics by series-connected FACTS devices," IEEE trans. Power Del., vol. 139, no.4, pp. 689-694, Oct. 1997.

[5] Gyugyi, " Unified power-flow control concept for flexible AC transmission system," Proc. Inst. elect. Eng.C, vol. 139, no.4, pp. 323-331, Jul, 1992.

[6] N.G. Hingorani and L. Gyugyi, Understanding FACTS. New York: IEEE Press, 2000.

[7] E. Gholipour and S.Saadate, " A new method for improving transient stability of power systems by using UPFC," in Proc. European Power Electronics, Toulouse, France, Sep. 2003.

[8] Z. Huang et al.,"Application of UPFC in interconnected power systems- Modeling, interface, control strategy, and case study, " IEEE Trans. Power Syst., vol. 15, no. 2, pp. 817-824, May 2000.

[9] K. Schoder, A, hasanovic, and A. feliachi, " Enhancing transient stability using fuzzy control scheme for the unified power flow controller (UPFC) within the power system toolbox (PST)," in proc. Midwest Symp. Circuits Systems, vol. 3, lansing, MI, Aug, 2000, pp. 1382-1385.

[10] K.K. Sen and A.J.F. Keri, "Comparison of field results and digital simulation results of voltage-sourced converter-based FACTS controller," IEEE Trans. Power Del., vol. 18, no. 1, pp. 300-306, Jan. 2003.

[11] F.D. Galiana, K. Almeida, M. Toussaint, J. Griffin, and D. Atanackovic: "Assessment and Control of the Impact of FACTS Devices on Power System Performance", IEEE Trans. Power Systems, Vol. 11, No. 4, Nov 1996

[12] N.G. Hingurani, L. Gyugyi, Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems, IEEE Press, New York, 2000.

[13] M. Noroozian, L. Angquist, M. Ghandhari, G. Anderson, "Improv-ing Power System Dynamics by Seriesconnected FACTS De-vices," IEEE Trans. on Power Delivery, Vol. 12, No.4, October 1997.

[14] M. Noroozian, L. Angquist, M. Ghandhari, "Use of UPFC for Optimal Power Flow Control," IEEE Trans. on Power Delivery,Vo1.12, No.4, October 1997.

[15] R. Billinton, M. Fotuhi-Firuzabad, O.S. Faried, S. Aboreshaid, "Impact of Unified Power Flow Controllers on Power System Reliability," IEEE Trans. on Power Systems, Vo1.15, No.1, February 2000.

[16] J.A. Momoh, J. Zhu, G.D. Boswell, S. Hoffman, "Power System Security Enhancement by OPF with Phase Shifter," IEEE Trans. on Power Systems, Vol. 16, No.2, May 2001.