



"Research paper on Unified Power Quality Conditioner (UPQC) to enhance Power Quality"

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ABSTRACT:

In this project the work is propose for powerangle management (PAC) to enhance power quality (PQ) in distribution system. This algorithmic rule reduces mathematical complication and its reaction time. it's aimed to create the designs of controller. The new idea is incorporates on triangle rules of vector addition/subtraction. The mathematical approach makes the algorithmic rule economical and comprehensive. The shunt voltage supply convertor (VSC) of unified power quality conditioner (UPQC) is controlled victimisation instant symmetrical part theory (ISCT). The ISCT allows UPQC to handle unbalanced and non-linear masses. the entire phasor diagram has been shown for numerous voltage conditions. A vector addition and subtraction-based mathematical calculation has been derived for estimation of various parameters of the projected system. projected committee will improve PQ in four wire distribution system with most utilization of series VSC of UPQC. A simulation study for voltage sag/swell with the new algorithmic rule for committee verifies the improved performance of the system. Results are mentioned in detail.

Keywords:-*PAC, voltage source converter, unified power quality conditioner, instantaneous symmetrical component theory*

I.Introduction:

With advancements in power physical science technology, power quality is changing into a crucial space in engineering. With custom power responsibility needed power quality problems mitigation is essentially needed. Effects of poor power quality ar mentioned generally, poor power quality could result into raised power losses, abnormal and undesirable behavior of kit, interference with close communication lines, so forth. The widespread use of power electronic primarily based instrumentality has place any burden on the ability

system by generating harmonics in voltages and currents and raised reactive current. Active power filters (APF) have created it attainable to mitigate some land quality issues intensive and well-documented surveys on the APF technologies covering many aspects ar imply. variety of devices are developed to mitigate the ability quality issues. These devices are named as custom power devices. The Unified Power Quality Conditioner (UPQC) could be a custom power device that is integration of series and shunt active power filters with common DC link .UPQC is one among the APF relations wherever shunt and series APF functionalities ar integrated along to attain superior management over many power quality issues at the same time.

II. Problem Statement

With the consequences of poor power quality being adverse on distribution system, custom power dependability is being compromised. to take care of custom power dependability and mitigate power quality issues custom power devices square measure used. There square measure range of custom power devices supported power natural philosophy technology namely-

1. Distribution Static Compensator (D-STATCOM).
2. Dynamic Voltage renovator (DVR).
3. Unified Power Quality Conditioner (UPQC).

Of all devices UPQC has higher compensation capability over D-STATCOM and DVR .

The performance of UPQC depends on however quickly the reference signals square measure generated for the filters. There square measure variety of techniques through that reference signals square measure derived for filters.

III. Proposed Work

- 1.Mathematical Formulation and Analysis of Power Angle management (PAC) strategy.
- 2.Simulation of UPQC with political action committee strategy for co-ordination of load reactive power demand between two filters victimization MATLAB/SIMULINK.
- 3.Simulation of UPQC with political action committee strategy for voltage sag/swell compensation and cargo

reactive power compensation victimization MATLAB/SIMULINK.

4. Study of ANN structures-ADALINE and Feed-forward MNN for extraction of elements.

5. Simulation of shunt APF of UPQC victimization ADALINE and Feed-Forward MNN (ANN primarily based control) victimization MATLAB/SIMULINK.

IV. Implementation Result

The performance of the planned conception of concurrent load reactive power and voltage sag/swell compensation has been evaluated by simulation as shown in Fig.

The performances of the planned UPQC-S approach are shown.

A. Waveforms :Before Compensation

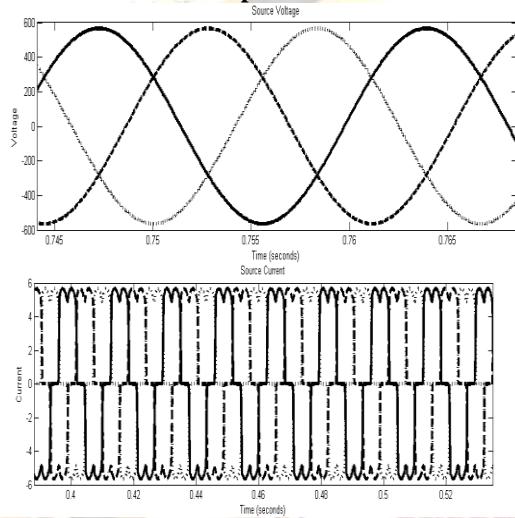


Fig.1. Waveforms for a) Source Voltage b) Source Current.

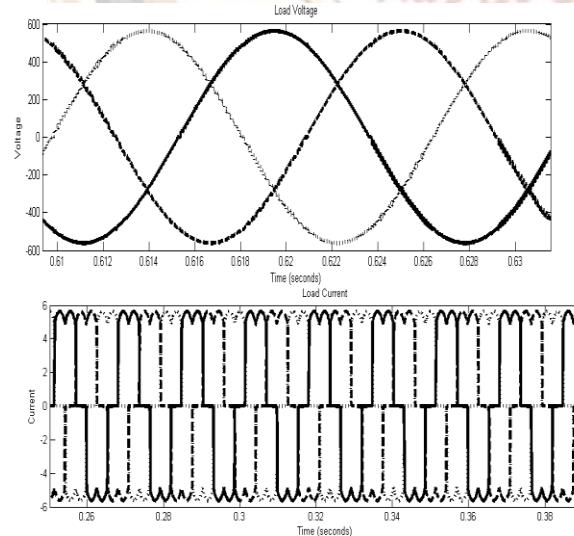


Fig.2 Waveforms for a) Load Voltage b) Load Current

B. Waveforms: After Compensation

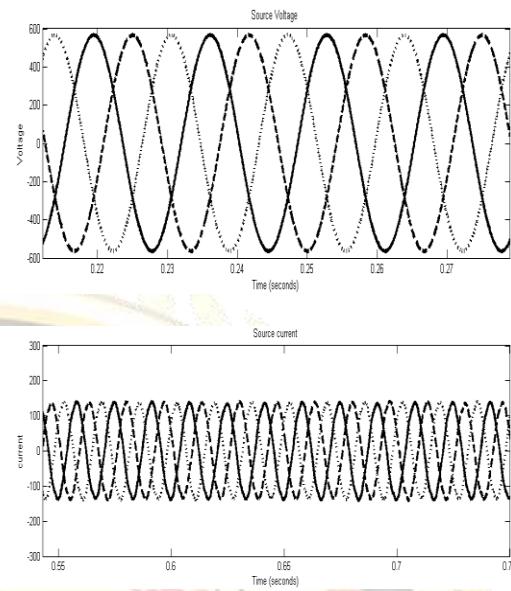


Fig.2 Waveforms for a) Source Voltage b) Source Current.

V. Conclusion

In this paper, a replacement construct of dominant complicated power (simultaneous active and reactive powers) through a series electrical converter of UPQC is introduced and named as UPQC-S. The planned UPQC-S construct is analyzed for voltage sag and swells conditions and developed mathematically. The developed comprehensive equations for UPQC-S is utilised to estimate the specified series injection voltage and therefore the shunt compensating current profiles (magnitude and section angle), and therefore the overall VA loading each underneath voltage sag and swell conditions

REFERENCES

- [1] R. C. Dugan, M. F. McGranaghan, and H. W. Beaty, *Electrical Power Systems Quality*, New York: McGraw-Hill, 1996.
- H. Akagi, "Trends in active power line conditioners," *IEEE Trans. PowerElectron.*, vol. 9, no. 3, pp. 263–268, May 1994.
- B. Singh, K. Al-Haddad, and A. Chandra, "A review of active filters for power quality improvement," *IEEE Trans. Ind. Electron.*, vol. 46, no. 5, pp. 960–971, Oct. 1999.
- M. El-Habrouk, M. K. Darwish, and P. Mehta, "Active power filters: A review," *IEE Electr. Power Appl.*, vol. 147, no. 5, pp. 403–413, Sep 2000.
- V. Khadkikar, "Enhancing Electric Power Quality using UPQC: A comprehensive review", *IEEE Trans. Power Electron.*, Vol 27,no.5,pp.2284-2297,May 2012
- J. R. Vazquez and P. R. Salmeron, "Three-phase active power filter control using neural networks," in Proc. 10th

Mediterranean ElectroTechnical Conf., 2000, vol. III, pp. 924–927.

M.A.Farahat, A.Zobah,"Active Filter for power quality improvement by artificial neural network technique",inUniversities power Engg.Conf,UPES2004,vol2,pp.878-883.

A. Elmitwally, S. Abdelkader, and M. EL-Kateb, "Neural network Controlled three-phase four-wire shunt active power filter," Proc. Inst. Elect. Eng., Gen. Transm. Distrib., vol. 147, no. 2, Mar. 2000

V. Khadkikar and A. Chandra, "A new control philosophy for a unified power quality conditioner (UPQC) to coordinate load-reactive power demand between shunt and series inverters," IEEE Trans. Power Del., vol. 23, no. 4, pp. 2522–2534, Oct. 2008.

V.Khadkikar and A.Chandra,"UPQC-S-A Novel Concept of simultaneous voltage sag/swell and load reactive power compensations utilizing series inverter of UPQC",IEEE Trans.Power Electron.,vol.26,no.9,pp.2414-2425,Sept.2011.

M.Qasim and V.Khadkikar,"Application of Artificial neural networks for shunt active power control",IEEE Trans.Ind.Electron.,vol.10,no.3,pp.1765-1774,Aug.2014 VadirajacharyaKinal,PramodAgarwal and Hari Om Gupta, "Performance Investigation of Neural Network based Unified Power Quality Conditioner" IEEE Trans.Power Del.,vol.26,no.1,pp.431-437,Jan 2011.

Bhim Singh, Kamal Al-Haddad ,Ambrish Chandra ,,"Review of Active Filters For Power Quality Improvement",IEEE Trans.Indl.Electron.,vol.46 ,no.5,pp.960-971,Oct 1999.

Hideaki Fujita and HirufumiAkagi ,,"The Unified Power Quality Conditioner :The Integration of Series and Shunt Active Filters",IEEETrans.Power Electron. ,vol.13 ,no.2,pp 315-322,Mar 1998.

Mauricio Aredes ,KlemensHeumann,Edson H. Watanabe,"A Universal Active Power Line Conditioner",IEEETrans.Power Del.,vol.13,no.2,pp.545-551,Apr 1998.

MetinKesler and EnginOzdemir ,,"Synchronous Reference Frame based Control method for UPQC for balanced and distorted load conditions,"IEEE Trans.Indl. Electron.,vol.58,no.9,pp.3967-3975 ,Sept 2011