International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 06 | June 2020 www.irjet.net p-ISSN: 2395-0072

# Overview of Repetitive Controlled Dynamic Voltage Restorer for enhancement of power quality

**Mitali A. Kalore[1], Harshal V. Takpire[2]**

*[1]MTech, 2nd Year student, Electrical Engineering, GHRU, Amravati, Maharashtra, India*
*[2] Assistant Professor, Dept. of Electrical Engineering, GHRU, Amravati, Maharashtra, India*

---

**Abstract -** *In this paper we propose a model for DVR called as Dynamic Voltage Restorer to stable fluctuation from input power supply. Mostly DVR work on 3 phase power supply, to examine our proposed model based on software blocks in MATLAB. We used version of 2013 SIMULINK to design our blocks representation for DVR model. Here we used DC to DC link with non linear load to get fluctuation from input side and test are output side of proposed model. Basically dynamic voltage restorer is combination of a power source with inductive and capacitive component it also contain inverter circuit and sensitive load. We use nonlinear load as compared to sensitive load. In a transmission line DVR at a very important role because this model will adjust injection of voltage and frequency with required values. will also demonstrate the fault detection of any phase , it also detect fault with respect to Ground in transmission line of three phase so if any Phase got faulty our model will indicates its waveform changes accordingly.*

***Key Words***: DVR, Dynamic Voltage Restorer, Power Quality, Fault Detection.

## 1.INTRODUCTION

It Compensate voltage sag and voltage swell and improve the regulation. If the voltages decreases then the problem created is known as sag and if the voltage increases then the the condition is known as swell. So it contains two end sending and receiving end, the drop in a line is current and impedance. We need to create a input source that's called as injected voltage which will be the opposite direction of drop of voltage support the direction has been cancelled. That's why I receiving and is approximately equal to the sending voltage. This idea is taken from olden days in DC generator. We also used drop in resistance and a small series generator is a injector in line. In DVR a part of inverter and DC required by the capacitor given from the energy source for TV system and CFL. Inverter converted DC into AC. DC required a capacitor from the energy source during the period of sag injected voltage is come in a role.

During the period of sag when i get the voltage receiving and voltage will be good. Drop maybe there due to fault in the nearby line so when there is a temporary fault in the duration I can inject the voltage and maintain batter voltage for this installer it is good to have filter in the output of the inverter so that the injected voltage will be a sine wave if filter is not there the injected voltage will be alternating square wave which will which will affect the power quality of the receiving

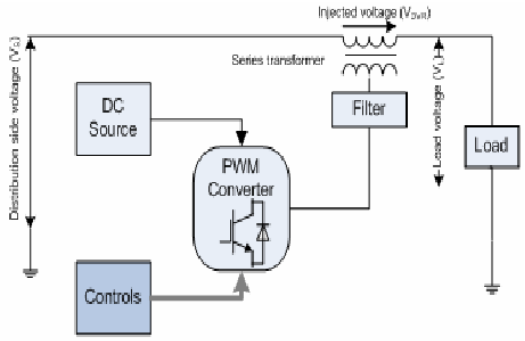


**Fig -1**: Basic Block Diagram

System needs fireing pulses that will give from a controller. It gives 5v pulse is amplified to 10v using driver and their given to the inverter.

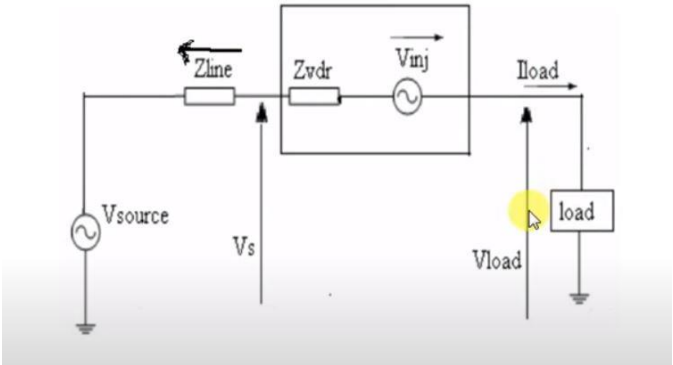


**Fig -2**: Basic Circuit

DVR for power quality the power quality term used power system to describe the variation of voltage current and power from its ideal waveform this power quality set of limit of electrical properties that allows electrical system to find in their indent manner without significant laws of power.

This is simulation secured of DVR system this is generator represented as Rle line is represented as R&L series load 1. Systems voltage decreases from originally if we not use DVR.

## 2. LITRETURE REVIEW

The UPFC, that was planned by Gyugyi in 1991, is one amongll|one amongst|one in every of} the foremost complicated FACTS devices in a power grid these days. It's primarily used for freelance management of real and reactive power in transmission lines for a versatile, reliable and economic operation and loading of power grid. till recently all 3 parameters that have an effect on real and reactive power flow on the road, i.e. the road ohmic resistance, voltage magnitudes at the terminals of the road and power angle, were controlled on an individual basis victimisation either mechanical or different FACTS devices like a Static volt-ampere Compensator (SVC), a Thyristor Controlled Series Capacitor(TCSC), a section shifter etc. However, the UPFC permits coinciding or freelance management of those parameters with transfer from one management theme to a different in real time. Also, the UPFC are often used for voltage support, transient stability improvement and damping of low frequency power oscillations.

Hongfa dong et. al. (2002) conferred a unique DVR consisting of a traditional 3 section voltage supply electrical converter at the side of Associate in Nursing electrode follower and is applicable in unbalanced there section four wire power distribution system. The 3 section voltage supply electrical converter is employed to eliminate the adverse influences of the negative sequence parts of the load voltage and to revive the load voltage to the given level, whereas the electrode follower is employed to eliminate the zero sequence parts.

Chairs Fitzer et. al. (2004) presents and verifies a unique voltage sag detection technique to be used in conjunction with the most system of a DVR. It's necessary for the DVR system not solely to discover the beginning and finish of voltage sag however additionally to work out the sag depth and any associated section shift. The DVR, that is placed asynchronous with a sensitive load, should be ready to respond quickly to voltage sag

Kaifei Wang et. al. (2004) delineate Associate in Nursing uninterrupted 3 section DVR supported 3 section four wire electrical converter. A rectifier is employed to provide the electrical converter of DVR and makes DVR compensate sag unceasingly. The soft section fastened loop methodology is employed to discover the supply voltage. The electrical converter is controlled by voltage house vector PWM rule that's totally different from the normal methodology.

## 3. METHODOLOGY

We use PI controlling to work on Steady state error. In this system and additionally its simple and uncomplicated implementation method KP and KI square measure proportional and integral gains severally. Proportional integral controller example if you want to increase study stated that means if you want to decrease study status if you want to increase the system response control system response which controller unit that means definite integral. Disadvantage is response of control system by decreasing the studies but there is a disadvantage that's going to affect the stability of the system if you are using integral controller in your control system so that will decrease the study stay together but at the same time it will affect the stability of the system so to overcome this we have in this proportional integral controller this proportional integral controller will do the same work of integral controller without affecting the stability of the system is not going to affect the stability of the system but it can decrease steady state error.

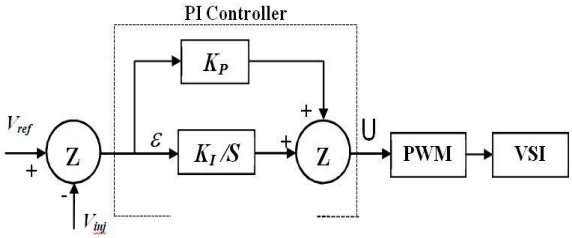


**Fig -3**: PI Controller Circuit

These constants accept their universe of discourses: wherever, values of minimum and most proportional and integral constants (gains) square measure much evaluated through experimentation and by mistreatment repetitive techniques, so creating style of the standard PI controller to be extremely obsessed on expert's data. Once the compensator constants exceed allowable price, the system might results into unstable state. Once determination of domain of the proportional and integral constants, the calibration of the instant values of the constants will turn up. Supported the worth of the error signal s, the worth of the constants adjusts to formulate adaptive system. The constants KP and KI can modification to make sure the steady-state error of the system, once reduced to minimum, if it's not zero.

## RESULT

The performance of DVR is studied with the PI controller and d-q-0 based algorithm. The DVR DC bus voltage is chosen as 400 V for the source line voltage of 415 V. The LV electric distribution network presented in this model is based on the standard network parameters. The length of the LV electric power distribution feeder ranges from 0.5 km to 5 km, the voltage levels and conductor type of the LV access network consist of 500 kVA, 415 VL-L, 220 VL-N through 11/0.415 kV, at 0.9 pf, 80 % transformer rating, based All Aluminium Conductor (AAC) standard.

## COCULSION

Here with the model we have successfully tested the various measure of fault with effects on transmission line using pi section area of various length wire. We also found that the system has integrated with three phase fault detection and DVR model to ensure the transmission line providing constant voltage without any fluctuation. If fluctuation comes inside of input power source then injected voltage or we can say career voltage will use to balance the fluctuation and provide constant output voltage at the load side.

## REFERENCES

[1] K.R. Padiyar "Facts controllers in power transmission and distribution" new age international (P) Ltd publishers, 2007.

[2] Michael D. Stump, Gerald J. Keane "The role, of custom power products in enhancing power quality at industrial facilities", Energy Management and Power Delivery, vol. 2, pp.507-517, International Conference 1998.

[3] P.pillay, M. Manyage "Definitions of Voltage Unbalance" IEEE Power Engineering eview, May 2001.

[4] D. Daniel Sabin, and Ambra Sannino, "A Summary of the Draft IEEE P1409 Custom Power Application Guide" Transmission and Distribution Conference and Exposition, IEEE PES, vol. 3, pp. 931-936, 2003.

[5] Masoud Aliakbar Golkar, "Power Quality in Electric Networks: Monitoring and Standards" the second world engineering conference, pp. 137-141 July 2002.

[6] N.G. Hingorani and L Gyugyi, Understanding FACTS – Concepts and Technology of Flexible AC Transmission Systems, IEEE Press, New York, 2000.

[7] N.G. Hingorani, Flexible AC Transmission",IEEE Spectrum, vol. 30, pp. 40-44, 1993.

[8] Yash Pal, A. Swarup, and Bhim Singh, "A Review of Compensating Type Custom Power Devices for Power Quality Improvement" IEEE Power India Conference, pp. 1-8, 2008.

[9] Fawzi AL Jowder "Modeling and Simulation of Different System Topologies for Dynamic Voltage Restorer" Electric Power and Energy Conversion Systems, EPECS '09. International Conference, IEEE, pp. 1-6, 2009.

[10] John Godsk Nielsen and Frede Blaabjerg "Control Strategies for Dynamic Voltage Restorer Compensating Voltage Sags with Phase Jump", Applied Power Electronics Conference and Exposition, IEEE, vol. 2, pp. 1267-1273, 2001.

[11] H.P. Tiwari and Sunil Kumar Gupta "Dynamic Voltage Restorer against Voltage Sag" International Journal of Innovation, Management and Technology vol. 1, no. 3, pp. 232-237, 2010.

[12] Paisan Boonchiaml, Nadarajah Mithulananthan, Rajamangala University of Technology Thanyaburi Thailand, "Detailed Analysis of Load Voltage Injection for Dynamic Voltage Restorers" TENCON, IEEE region 10 conference, pp. 1-4, 2006.