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Improvement of Stability of System Curing Voltage Sag using Dynamic Voltage Restorer

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Abstract: ***Higher power move in a wide interconnected system prompts genuine, security need in power framework tasks additionally if an abrupt blame happens there is an adjustment in voltage profile which can prompt an unexpected harm on burden end. These voltage hangs are remunerated at generator side by different strategies yet at the heap end there is a possibility. to maintain a strategic distance from such list at burden side a tangle lab show is proposed in which a transmission line is nourished with two sources out of which one is a breeze source and after that is exposed to a 3 stage blame. the voltage hang which happens is repaid in the other model at same moment when DVR Dynamic voltage restorer is modified and is associated at the midpoint of lattice. The outcomes acquired demonstrates that the voltage is redressed and profile is adjusted, DVR utilizes the vitality source in all around planned way and infuses vital AC voltage to framework.***
Keywords: DVR, matlab simulation ,short transmission line, DFIG

I. INTRODUCTION

The economy put resources into the dissemination framework is sufficiently extensive to consider the idea of hardware insurance against different unsettling influences that influences the unwavering quality of the conveyance framework as well as the whole power framework joining age and transmission as well. The wide acknowledgment of refined electronic gadgets at the utility end break down the nature of supply and utility is experiencing its awful impacts on extensive scale. The different power quality problems[1] envelop the voltage hangs, voltage plunges and voltage swells, flashes, music and homeless people joined by lopsided power, which are aftereffects of different deficiencies with three stage blame being the most serious among all, beginning of enlistment engine which is frequently utilized because of its tough development, turning off substantial loads and invigorating of capacitor banks. Voltage hang is one of most vital power quality issues on the grounds that the expanding utilization of voltage affectability gadgets has made modern procedures progressively vulnerable to supply voltage. Custom power gadgets are fundamentally utilized in voltage list moderation, assurance and control of touchy burdens, responsive power and voltage guideline and symphonious end applications. There are different methods which have been proposed to mitigate the voltage sags like Uninterruptible Power Supplies (UPS), network reconfiguration devices like Static Transfer Switches (STS), DSTATCOM and series compensating devices like Dynamic Voltage Restorers (DVR). The capability of DVR control schemes is demonstrated using MATLAB/SIMULINK simulations. The Simulink models have been developed for the distribution networks with linear and non-linear loads. The proposed DVR for 10kV distribution line has been assumed to be located in medium voltage distribution network level and it can mitigate three-phase sags The DVR has been designed with special importance at the control of PWM inverter i.e. fuzzy logic control. On the distribution side there is always a probability of highly sensitive load like hospitals ,communities etc and therefore on switching multiple loads the voltage profile experiences a jerk sag which can damage the load hence voltage profile needs to be maintained which is dine through fuzzy logic controlled DVR

II. LITERATURE SURVEY DONE

C. Sankaran [1] introduced the clear description of power quality & its associated problems in power system. He presented the examples & steps to solve power quality problems in terms of illustrations, figures & their worst effects on power system performance leading to disruptions & substantial economic losses.

N.G.Hingorani *et al.* [2] introduced a technology popularly known as FACTS (flexible Ac transmission system) based on power electronics to enhance the controllability, stability & power transfer capability of ac transmission system. He revolutionized the area of power electronics by discussing in-depth the FACTS controllers

N.H. Woodley *et al.* The proposed DVR was installed on 12.47-kV system at an automated yarn manufacturing and weaving factory where it protected the plant from disturbances from the distribution system.

John Godsk Nielsen *et al.* [16] tested and controlled DVR with advanced technique at medium voltage level of 10kV.The DVR is tested for different methods to initiate voltage dips.

U. Vidhu Krishnan *et al.* [20] presented a control system based on dqo technique which is a scaled error between source side of the DVR and its reference for sags/swell correction. His work confirmed the effectiveness of the device in compensating voltage sags and swells with very fast response (relative to voltage sag/swell time) by MATLAB using simulation.

A. Power Quality Problems

1) *Voltage Sag:* It is a short duration disturbance. During voltage sag, r. m. s. voltage falls to a very low level for short period of time.
2) *Voltage Swell:* It is a short duration disturbance. During voltage sag, r. m. s. voltage increases to a very high level for short period of time.
3) *Power System Transients:* They are fast, short-duration events that produce distortions such as notching, ringing, and impulse. The mechanisms by which transient energy is propagated in power lines, transferred to other electrical circuits, and eventually dissipated are different from the factors that affect power frequency disturbances.
4) *Flicker:* It is visual effect and undesirable frequency variation of voltage in a system.
5) *Ringing Waves:* Oscillatory disturbances of decaying magnitude for short period of time is known as ringing wave. It may be called a special type transient.
6) *Outage:* It is special type of interruption where power cut has occurred for not more than 60 s due to fault or mal-tripping of switchgear/system.

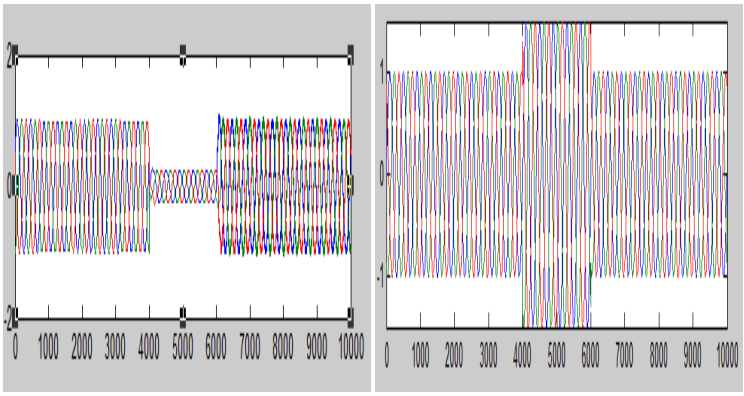

Fig. 1 Output voltage

B. Power Quality Solution DVR

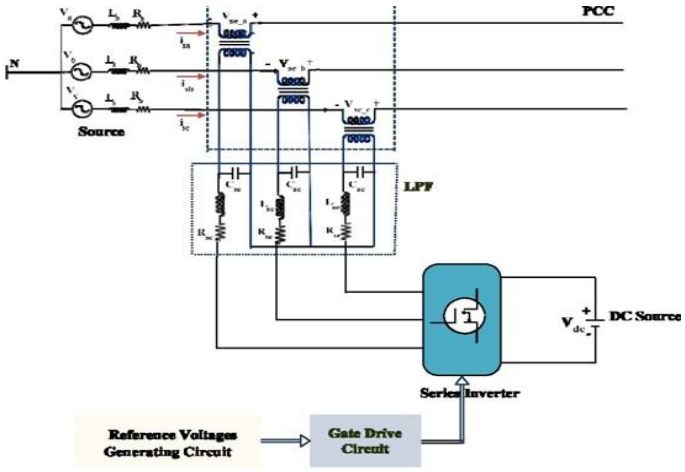

Fig. 2 Dynamic Voltage Restorer

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C. Matlab Simulation & Results Using Dvr In Line

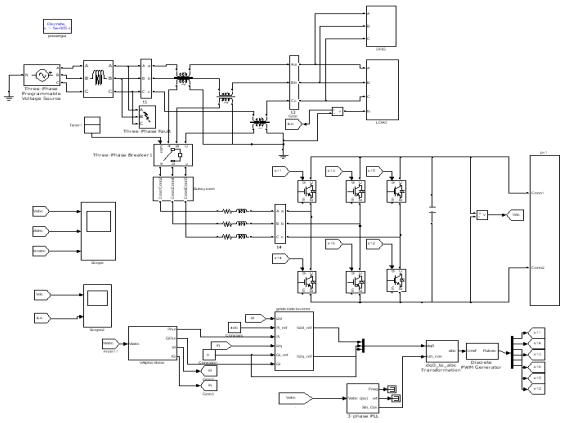

Fig. 3 Simulation Model

III. SIMULATIONS AND RESULTS

A. The system runs at 50 Hz frequency and total simulation time is chosen to be 0.35 seconds in each case. The scope connected to the V-I measurements at supply side.

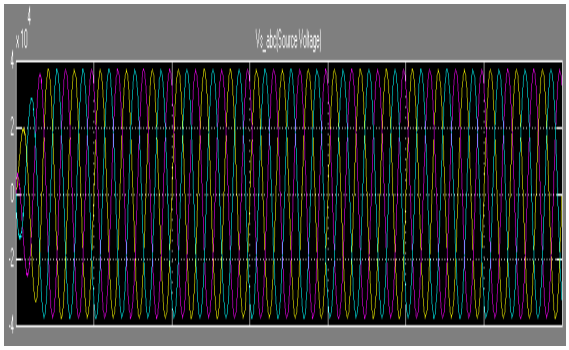

Fig 4 Voltage Sag due to DFIG/disturbances

B. Load side gives the simulations of supply voltage having sag and the voltage across load. We have taken DFIG and three phase programmable sources. The disadvantage of DFIG as a source is that it creates voltage misbalance in the system due to which sag is produced. In Fig it is observed that initially there is no voltage injection and power flow from DVR to the system. As no voltage sag is sensed. As soon as the load becomes unbalanced the voltage sag occurs.

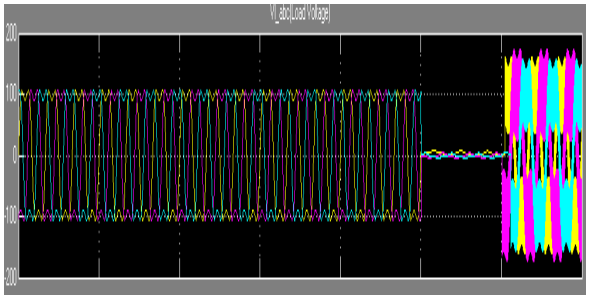

Fig 5 Voltage Sag due to DFIG/disturbances

After the occurrence of Voltage Sag DVR comes into action and injects voltage which somewhat lessen the sag. Thus the system becomes more stable. the sensing of DFIG disturbances by the DVR results in a rectified output voltage profile in which the voltage sag is compensated. the proposed methodology proves very unique that rectified the critical load changes disturbance problem.

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C. The primary task of DVR is providing the high quality voltage to the critical loads. DVR enable the proposed system for providing a good power and voltage quality to the critical load. The controller output signals stabilize when all the phase voltages of the load attain the desired value. DVR gives high performance in injecting the more in-phase voltage with proper polarity and phase angle.

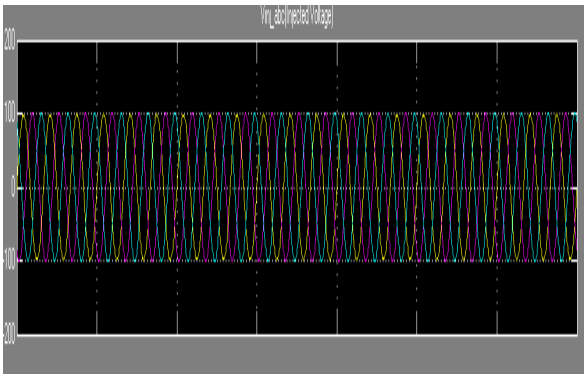

Fig 6 Injected Voltage due to DVR.

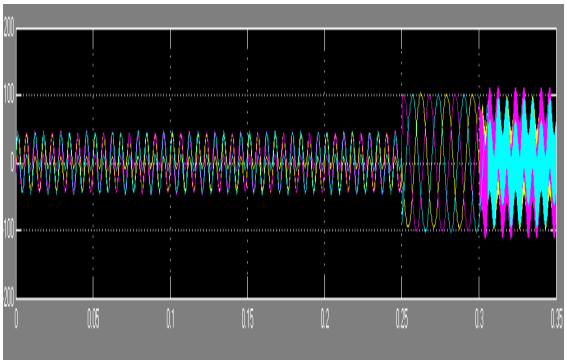

Fig 7 Final rectified voltage by DVR

D. The Fig Illustrates how quickly the DVR responds for sudden changes to keep the sensitive load voltages at reference value. The calculated injection voltages exactly compensate the sag because the controller exactly calculates the missing voltage. Also the exponential rising curve of energy storage device above depicts that the sensing done by DVR for voltage sag and response given by capacitor storage resolves the problem, the single-phase PWM inverters managed by the control system generate the three distinct series inverter output voltages to compensate the source voltages at different sag level. In the last figure the total harmonic distortion are under control below 4 percent as shown

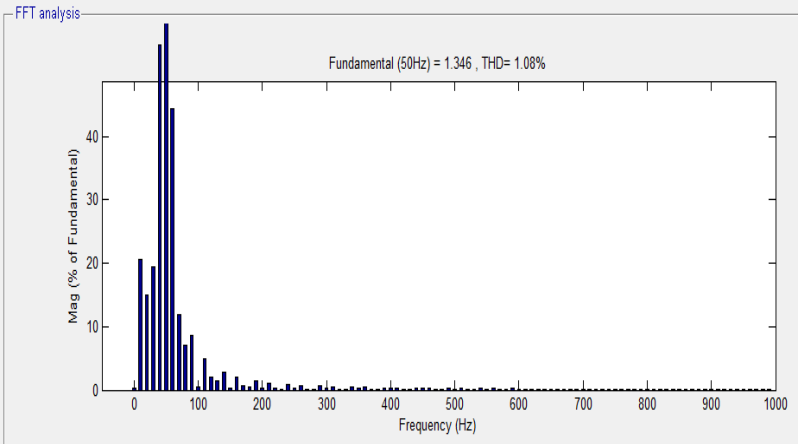

Fig 8 THD Outcome of model with DVR

Comparison chart with previous paper

	PREVIOUS WORK		CURRENT WORK
1	An enhanced sag compensation scheme has been proposed for the capacitor-supported DVR.	1	We are proposing IGBT Based DVR system
2	The proposed strategy improves the voltage quality of sensitive loads by protecting them against the grid voltage sags involving the phase jump.	2	Our Strategy also improves the voltage quality and also protects against sag from wind source
3	Only supply from Grid has been taken into consideration.	3	We are considering wind source also in which DFIG is a major source of DVR.
4	Harmonic consideration is not done.	4	We are taking harmonic consideration also.
5	Modelling of DVR is done with only one source	5	We are considering multiple source which work one at a time.

IV. CONCLUSIONS

In this work, savvy and solid custom power idea, dynamic voltage restorer is utilized to relieve the voltage hangs in the circulation framework, in this manner improving the execution of the framework. The different control procedures are utilized and tried for 11kV conveyance framework. The PI controller based DVR, fluffy controller based DVR and PI-fluffy controller based DVRs are associated well ordered in the repaid feeder to look at their exhibitions. The adequacy of various control systems based DVRs for static straight

V. FUTURE SCOPE OF WORK

With the expansion use in number of advanced electronic gadgets by the modern clients to expand their proficiency and profitability, it is critical to guarantee dependable power supply even under the framework unsettling influences. To meet the shifting framework parameters and conditions, different other non-straight controllers can be utilized.

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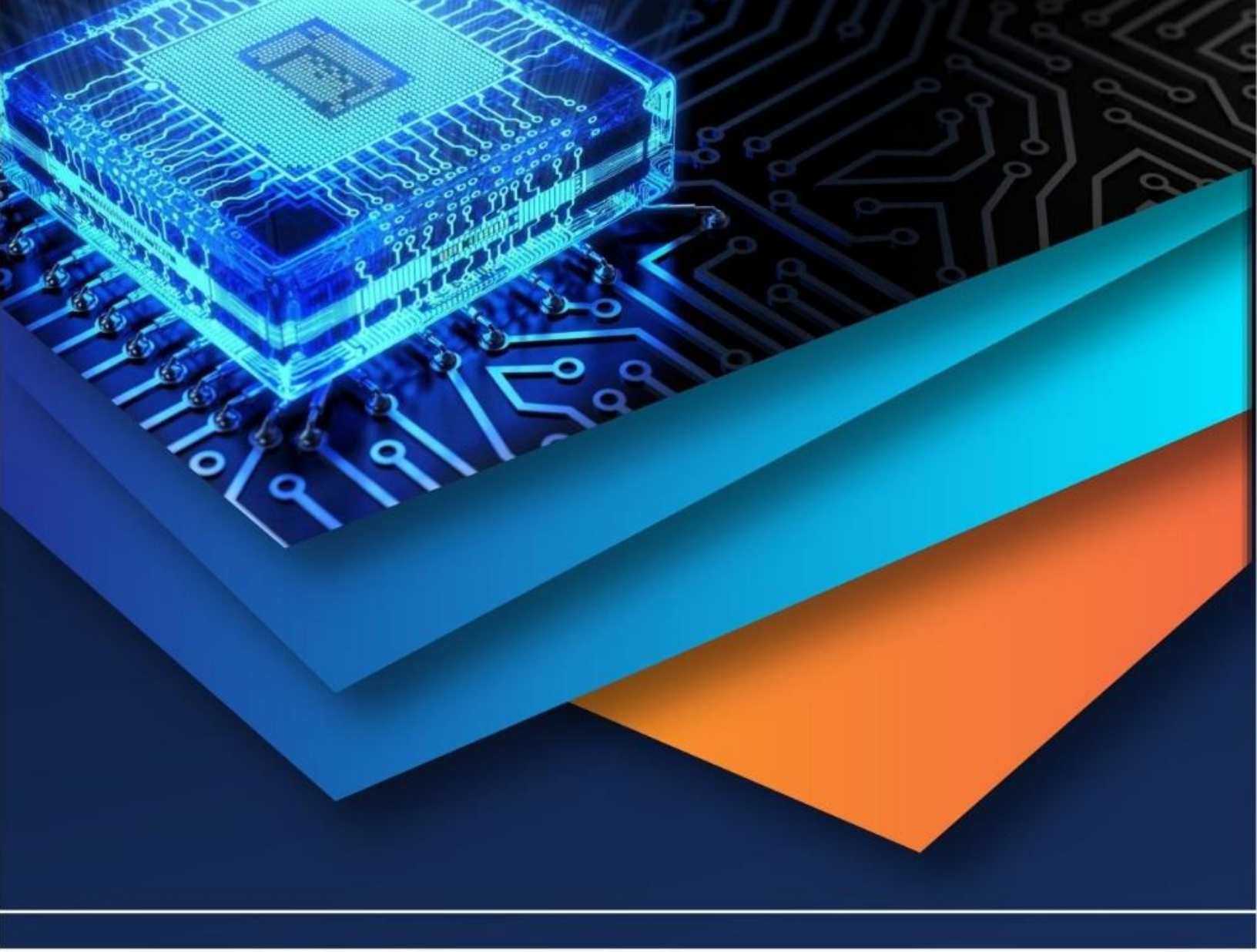

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