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Positive Sequence Voltage in Windsystem Improvement under Unsymmetrical Faultage

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Abstract: *The wind farms which are recently installed are of erratic speed type. Due to the erratic speed and unsymmetrical fault condition the voltage become unbalance. Whenever the voltage sag/swell is present in a system, the induction generator may perhaps consume a bulky quantity of reactive power, the results of progression of faults and voltage collapse is due to the speed deviates as of synchronous speed. Whenever unsymmetrical faults occur in a wind farm, positive sequence voltages are formed. DVR is connected to wind system is investigated using MPPT with synchronous reference frame (SFR) control action as demanded in definite grid code. A new control technique is purposed for recovery of positive sequence voltages under asymmetrical fault and where the system speed is variable.*
Key Word*:DVR, wind fram, PWM technique, positive sequence voltage, synchronous reference fram control, MPPT controller.*

I. Introduction

The wind farms which are recently installed are of erratic speed type. Due to the erratic speed and unsymmetrical fault condition the voltage become unbalance. Whenever the voltage sag/swell is present in a system, the induction generator may perhaps consume a bulky quantity of reactive power, the results of progression of faults and voltage collapse is due to the speed deviates as of synchronous speed.

A new control technique is purposed for recovery of positive sequence voltages under asymmetrical fault and where the system speed is variable. To optimize the real power requirement during compensation, Combination of both the in-phase and pre-sag compensation technique be used in the above developed control. In the control technique the system generates a haphazard reference voltage waveform with the nominal voltage amplitude and the frequency with automated synchronizing control.

In [2], provided an detail information about FACTS devices. The core advantage of the FACTS devices is that they permit for augmented controllability and optimum loading of the lines devoid of exceeding the thermal limits. A greater dependability and enhanced excellence of power flow to load centers in the system by lucratively compensating for harmonic distortions, interruptions, voltage sags/dips, surges, and flicker, which are the numerous complications linked with lines this ensure by Custom Power devices.

In [12], the chapter starts with a brief background of wind energy conversion systems. In this paper MPPT controllers used for pull out the maximum power from generators and Tip speed ratio control, hill-climb search control and feedback control power signal are the three controllers are classified. This paper offers appraisals of past and present MPPT controller. The MPPT controllers are used and presented in this research for extracting maximum feasible power in WECS.

II. Need Of Positive Sequence Voltage Recovery

Compensation of positive sequence voltage is vital for system stability. For improving voltage instability and dynamic instability of wind farm, compensation of positive sequence voltage is vital.

III. System Description

The system consists of Transformer, Filter, Voltage source inverter, and control system. In control system there are dq0 controller, MPPT with Duty cycle Adjustment, and PWM generator. Three phase voltage turn out to be distorting when there is a fault stipulation. Also, voltage will be less considerable than fundamental positive magnitude. Positive, negative and zero sequence components are present in the system when there is a distort condition. And positive sequence component exist only in poise condition.

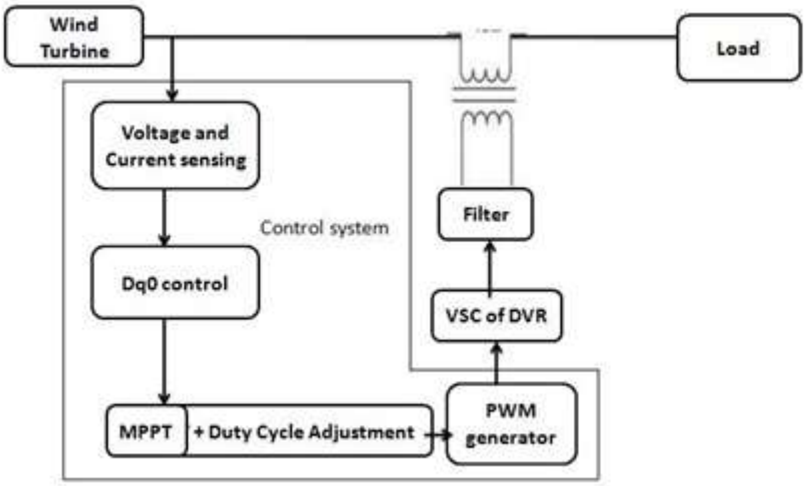

Figure 1 System block diagram

In the purposed control scheme, under unbalance or fault condition, source voltage is decomposed into positive, negative and zero sequence voltage. Firstly the positive voltage components are extracted and then it altered to αβ reference variables and again αβ is altered to dq reference frame variables. As d-axis of the voltage component is relative to itsmagnitude, it is easy to obtain required magnitude for voltage unbalance improvement. Positive sequence reference voltage is compared with the d-axis voltage magnitude. Error of the reference voltage and the real fundamental magnitude are summed in direct axis. Consequently, at any fault condition the crest magnitude is obtained. Then, dq is altered to a-b-c reference frame variables. Consequently, a-b-c is compared with the actual sourcevoltage. According to P&O algorithm MPPT tracks the maximum power point and that voltage is compared with the carrier signal to obtain PWM signals. To diminish the voltage unbalance, PWM signals are engendered and are given to the VSI.

IV. Srf (Synchronous Reference Frame) Control OfDvr With Mppt Controller

The reference load voltage V_L is extracted using the derived unit vector (sinθ, cosθ). VLa,VLb, VLcare converted to the rotating reference frame usingabc−dqoconversion via Park'stransformation with unit vectors (sinθ, cosθ) derived using a PLL as

VLd cosθ cosθ − cosθ + VLaref (1)
VLq= sin θ sinθ − sinθ + VLbref
VL0 VLcref

Correspondingly, and voltages at the PCC are also converted to
V La, V Lb, V Lc vS
frame. Then, the DVR voltages are obtained in the rotating reference
the rotating reference * * *
frame as:

VDd = VSd – VLd (2)

VDq = VSq – ᵁLq (3)

The reference DVR voltages are obtained in the rotating reference frame as

$V^*_{Dd} = V^*_{Sd} – V^*_{Ld}$ (4)

$V^*_{Dq} = V^*_{Sq} – V^*_{Lq}$ (5)

With reverse park's transformation reference DVR voltages in the abc frame are obtained as:

$$\begin{bmatrix} V^*_{dvra} \\ V^*_{dvrb} \\ V^*_{dvrc} \end{bmatrix} = \begin{bmatrix} \cos\theta & \sin\theta & 1 \\ \cos\theta - & \sin\theta - & 1 \\ \cos\theta + & \sin\theta + & 1 \end{bmatrix} \begin{bmatrix} V^*_{Dq} \\ V^*_{Dd} \\ V^*_{D0} \end{bmatrix} \quad (6)$$

Reference DVR voltages and definite DVR voltages are used in a pulse width modulated (PWM) controller to generate gating pulses to a VSC of the DVR.

V. Maximum Power Point Tracking

The output power of wind energy system varies continually as wind speed changes. To operate in changeable-speed conditions, a wind energy system wants a power electronic converter. Numerous works have considered the different feasible configurations of electrical generators and power converters for changeable-speed wind turbine systems.

The P&O algorithm is adopted in this work. It is also called as "hill- climbing". In this method, MPP does not be positioned at an exacting point but it moves around the power curve depends on aerodynamic speed. When variation between prior power and current power is not zero, this algorithm will attempt to locate optimal point in left or right side of recent position. The progression is repetitive until MPP is reached. Then operating point oscillates around MPP. Figure 2 shows the algorithm of MPPT.

VI. Simulation Results

The simulation outcome shows the effectiveness of the proposed control strategy under unsymmetrical fault in the wind generation system, where the source spe eds is variable. The block diagram of the system control structure is shown in Fig. 1, where the positive sequence voltages are anticipated with SRF together with MPPT controller. Figure 3 and 4 shows the result for recovery of voltage under L-L-G fault and L-G fault in wind gen eration system.

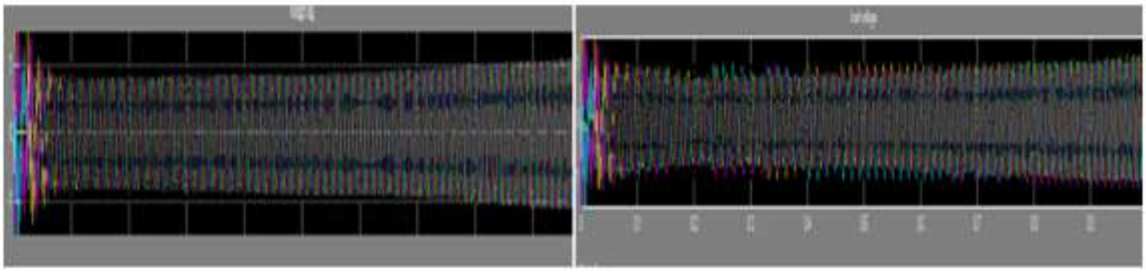

Figure 3 Voltage sag & voltage swell and load voltage under L-L-G fault

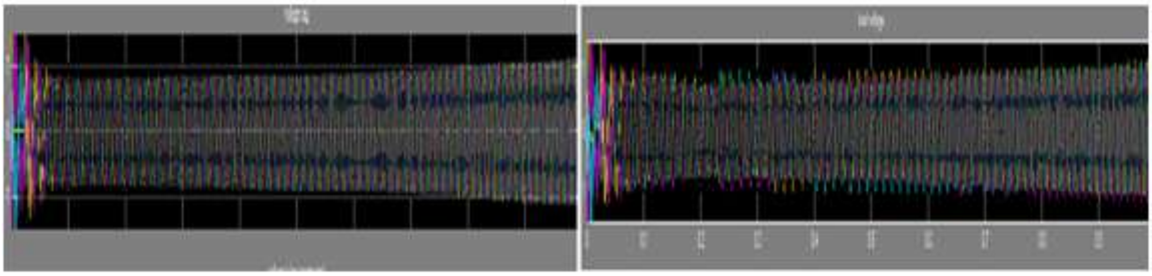

Figure 4 Voltag e sag & voltage swell and load voltage under L-G fault

VII. Conclusion

In this paper, a different control strategy of DVR has been presented. The obtained results indicate that the control strategy of DVR is working successfully. Basically it gives the recovery of positive sequence voltage when the system gets disturbed due to fault occurrence and maintains the maximum power through MPPT.

MPPT is used because the wind speed changed throughout a day. From the new control technique of DVR in wind generation, this result will boost the FRT capability of renewable energy system.

References

[1]. Anto Joseph, Nagarajan And Antony Mary. A Multi Converter Based Pure Solar Energy System With High Efficiency MPPT Controller. International Journal of Electrical Engineering and Technology (IJEET). 4 (4), 2013, pp.205–212.

[2]. Shimi S.L, Dr. Thilak Thakur, Dr. Jagdish Kumar, Dr. S Chatterji and Dnyaneshwar Karanjkar, Anfis Controller For Solar Powered Cascade Multilevel Inverter. International Journal of Electrical Engineering & Technology, 3 (1), 2012, pp. 234-240.

[3]. Chinmayi and Dr. B.G. Shivaleelavathi, Enhancement of Fundamental RMS Output Voltage of 5-Level Cascaded H-Bridge Multilevel Inverter Using Modified Multi-Carrier PWM Technique. International Journal of Electrical Engineering & Technology, 7 (1), 2016, pp. 17-29.

[4]. Vishal Rathore and Dr. Manisha Dubey , Speed Control of Asynchronous Motor Using Space Vector PWM Technique. International Journal of Electrical Engineering & Technology, 3 (3), 2012 , pp. 222-233

[5]. Mohd. Mohsin Khan and Dr. Amrit Kumar Roy, CFD Simulation of Wind Effects on Industrial RCC Chimney. International Journal of Civil Engineering and Technology, 8(1), 2017, pp. 1008–1020.