Performance Analysis of Grid Synchronization Method for Three-Phase Three-Wire Networks under Grid Fault Conditions

Tirumala Anitha[1], B.Rajani[2], G.Seshadri[3], Ch. Kamal[4] R.Devasaran[5] S. Sivaganesan*[6]

[1]Department of ECE, Holy Mary Institute of Technology and Science, Hyderabad, Telengana, India.
[2]Department of EEE, Aditya college of Engg.& Tech ,East godavari, Andhra Pradesh India.
[3,4,5,6]Department of EEE, Holy Mary Institute of Technology and Science, Hyderabad, Telengana, India.
* Correspondence Author email id: siva_phd@outlook.com

Abstract: ***In this paper, very important in the control of grid-connected electrical power converter by using synchronization algorithms employed, as quick and error less detection of the grid voltage is critical in order to apply constant control strategies under grid conditions. This paper represent a proposed grid synchronization method for three-phase three-wire system, specifically three-phase modified enhanced phase-locked loop (EPLL)with PLL is a bringing together the system that has proved to produced better power output in single phase synchronization systems. An E-PLL is fundamentally an adaptive band pass filter, which is able to vary the cutoff frequency as a utility of the input signal .in order to eliminate the positive-sequence vector of three phase signal if formation was adaptive later. Different propose problem is there when synchronization. in addition, synchronizing method with particularly unbalanced grid is proven by means of by using simulation and its performance.***

Key words: Grid, Power converters, EPLL

I. INTRODUCTION

Now a days, the use of power electronics and information and communication technology (ICT) applications are key issues in the development of future electrical networks. The high penetration of renewable energy sources such as wind power and photovoltaic, experienced in the last decades is a good example, [1]as two power generation systems are connected to grid mention that power converter based system, that power delivered to the network should not controlled by the system. Under general condition they should be supply of grid stability , support the grid voltage as well as frequency. Main point of point of common (PCC)coupling is the important issues while using the converter..Although under normal operation conditions, the grid sinusoidal and voltage are balanced. Under these conditions, grid-connected power converters should be suitably coordinated with the grid in order to stay energetically connected, at the bottom of the grid services and keeping the generation up and running .normally these are now a day's formers needed. In all grid codes(GCs)for the connection of distribution generated systems to the network, where the criteria for the injection of reactive power and active power under unbalanced and balanced condition are also provided. In the fact of dynamic character of grid to come with the not defined in grid codes, to get the better dynamic response in the synchronization .[2] phase locked loops have traditionally used for synchronizing the control system of converter with the grid induced voltage wil be based up on algorithms. In Fig. 1, shows that 3-phase power converter fed to the grid. grid synchronization is responsible for frequency magnitude and phase angle of negative and positive component. of the grid voltage, v±, ω, and θ ±, respectively. In reference generator will get the modulated value of voltage V*C. will settle the destiny value from current control block, these value will used latter.[3] dependable of determining the current reference to be tracked. Power generation station, this system will be differ in case of converter behave like active filter, a STATCOM. Three phase grid synchronization system, PLL based synchronous reference frame (SRF-PLL) is used. Negative-sequence component of SRF-PLL is not able to process ,because of grid unbalanced voltage .in order to reduce this issues, in order to redefine these issues, now a days lot of methods is proposed in difficult grid voltage synchronization .the effect of positive and negative sequence voltage is depends up on the use of two SRFs and decoupling network. when uses of two SRFs and decoupling network to isolate the effect of the positive and negative sequence voltage for the case of decoupled double SRF PLL(DDSRFPLL).[4] another methodology of synchronization method was offered to find out ,other 3 single phase enhanced PLLs are joint together with upper positive sequence calculator to synchronize with unequal and distorted three-phase networks exclusive of using any SRF. Allowing of same structure, approach of other single- phase PLL , like those presented in, input signals can be provide to the positive- sequence calculation algorithm.

II. PROBLEMIDENTIFIED

DES technologies have very different issues compared with traditional centralized power sources. For example, The voltage level less than 490V means need to converters. All of these energy technologies provide a DC output which requires power electronic interfaces with the distribution power networks and its loads. For instant regulation for voltage magnitude, regularly used conversion system is pulse width modulation (PWM) and voltage source inverter. Power electronic converter interfaces introduce new control issues, but at the same time, new possibilities. For example, micro

generators and storage devices are operate in both autonomous mode and feed to power grid.[5]in power sources facts is the major issues and higher level is fuel cell and micro turbines feedback is less .it need to recap that, current power system have cargo space in power generator inertia and it may be affect the system frequency. We need to link them to less voltage is increase, when these generator becomes wore reliable . distribution network has not able to designed to connect a important to generator because of nor including of any kind of voltageTherefore, a new voltage control system to facilitate the connection of distributed generation resources to distribution networks should be developed. In lot of cases there are also higher value technical barriers to running independently in a standalone AC structure, or to connecting tiny generation systems to the electrical distribution network with lower voltage, and the recent research issues includes: 1. Control strategy to facilitate the connection of distributed generation resources to distribution networks. 2. Efficient battery control. 3. Inverter manage based on only limited information. 4. organization with the utility mains. 5. reimbursement of the reactive power and large harmonic components. 6. Load sharing. 7. System protection. 8. Power Factor Correction. 9. Requirements of the customer 10. Reliability of communication.. DES offers significant research and engineering challenges in solving these problems. Furthermore, the economic relationship between electrical generation system with clients and the distribution utility and among customers may take forms quite distinct from those we know today. For example, rather than devices being individually interconnected in similar with the grid,

III. PROBLEMDESCRIPTION

New novelty approaches to managing and operating the distributed resources are interconnected to the low grid voltage or low voltage cause induces new issues. In the fields of Power Electronics and industrial drives, the recent papers have focused on applications of a backup generation, a autonomously operation Alternative current system, a combined heat and power (cogeneration) system, and interconnection with the grid of distribution generations on the distribution system, and have recommended technical solutions which would permit to concentration more generators on the network in good conditions and to perform a good voltage regulation. Depending on the load, generation level, and local connection conditions, each generator can cause the problems described in the previous chapter. The main goals which should be achieved will thus be to increase the network connection

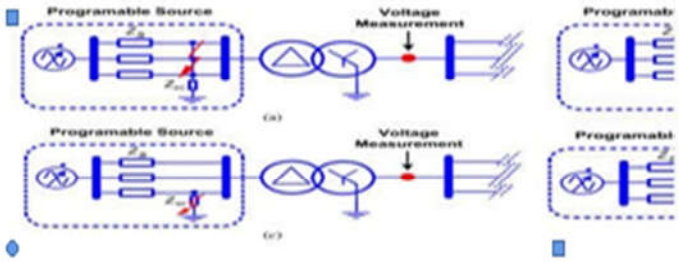

Fig. 1. Generation of grid voltage sags in the experimental setup. (a) Generation of a Type "A" voltage sag. (b) Generation of a Type "B" voltage sag. (c) Generation of a Type "C"

Likewise, other synchronization structures have been proposed for three-phase systems based on PLL, as those published in. However, the dynamical response of these algorithms is very receptive to phase angle lift in the voltage at the PCC due the fact that the PLL is synchronize with this variable. due to change of network impedance, serious demerit is sudden angle change are accrue. In this paper, a novel come within reach of frequency locking system as an alternative of phase locking will be presented as an more efficient method for grid synchronization less than adverse grid conditions.

IV. SOLUTION TO THEPROBLEM

Facts controllers are the best of solution to that problems. Here we have to control the facts devices by considering different types of PLLS. In this project we develop following EPLL Structure.

3phase EPLL Discretization:

The block diagram of the EPLL implemented in this paper is presented in Fig

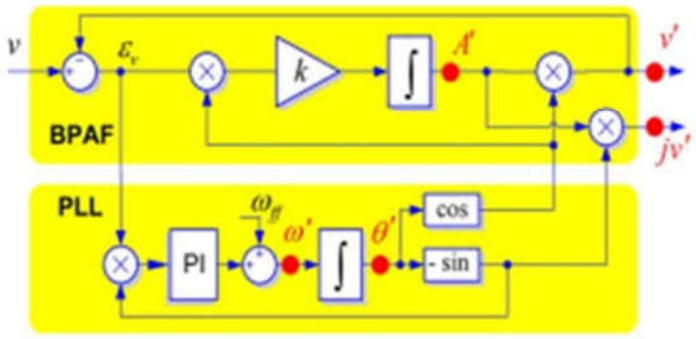

Fig. 2. Quadrature signal generator based on an EPLL structure.

According to this diagram, the state space representation of the output of EPLL continuous domain of EPLL is written as shown in finally,the output of EPLL can be define(13)after calculated of state variable is

$$v'[n+1] = A'[n+1] \cdot \cos\left(\theta'[n+1]\right)$$

$$qv'[n+1] = -A'[n+1] \cdot \sin\left(\theta'[n+1]\right).$$

More accurate turning need this type of discretization it cal be different the factor that, constant regions of the z-plane ,s-plane However, major advantage is , compared to the backward integration or Tustin , merits from the computational speed of this block

V. MATLAB/SIMULATIONRESULTS

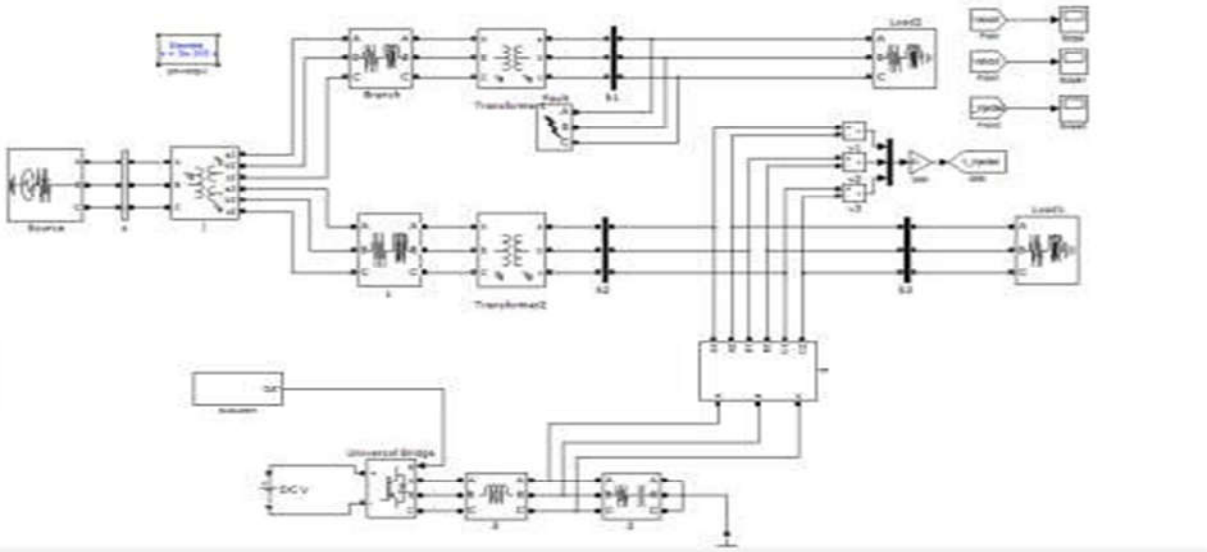

Fig.3 MATLB/SIMULINK diagram of proposed system single phase sag

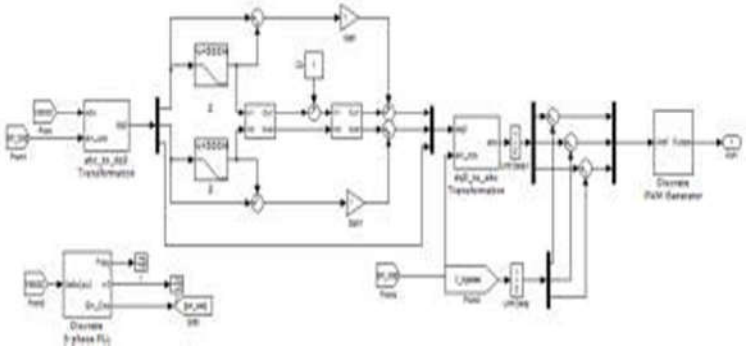

Fig.4 controller Subsystem

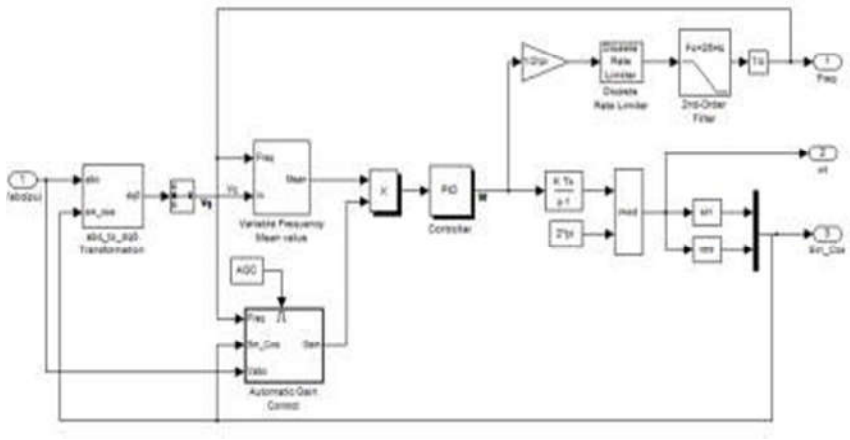

Fig.5 Discrete phase PLL SINGLE

PHASE SAG:

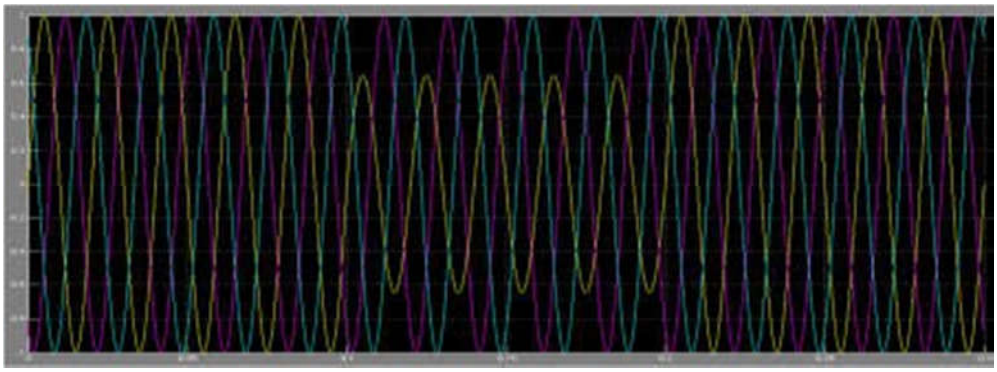

Fig.6 bus 2voltage

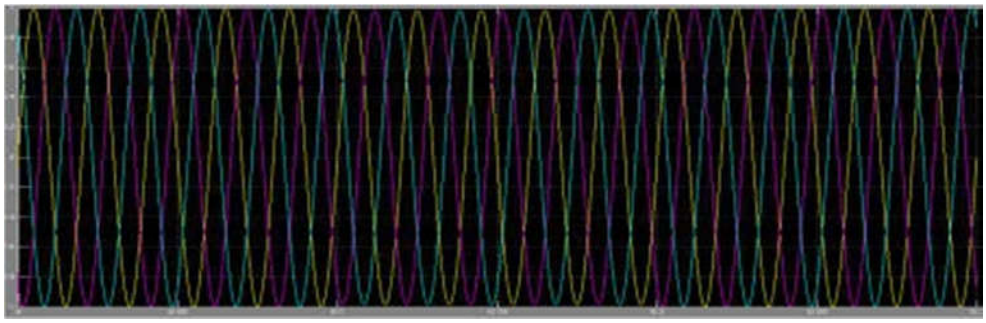

Fig.7 bus 3voltage

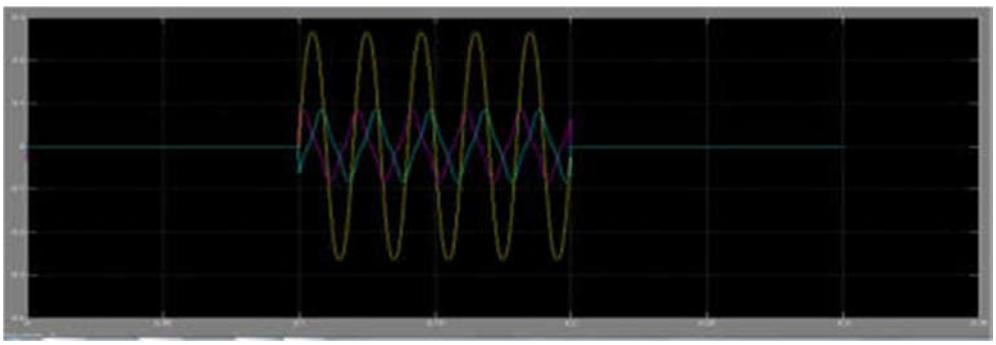

Fig.8 injected voltage

THREE PHASE SAG

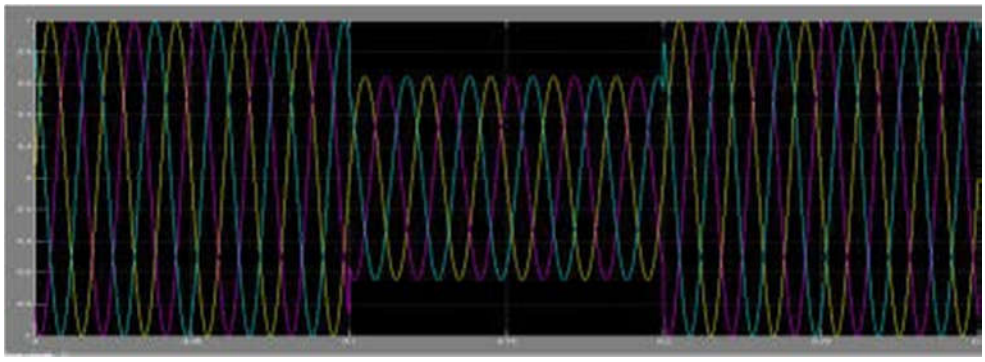

Fig.9 bus 2 voltage

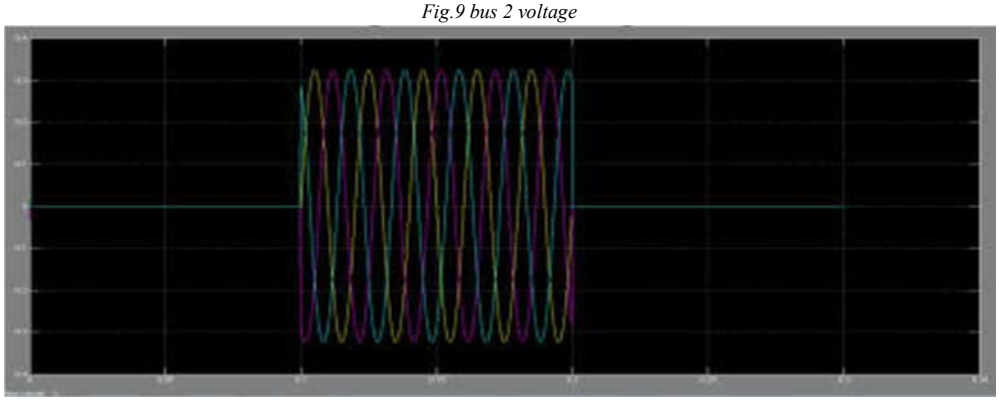

Fig.10 injected voltage

VI. CONCLUSION

In the research paper, the phase tracking is very necessary for grid synchronization, process of organization of DC. Magnitude, phase data for suggestion of fundamental positive-component of power grid system, to find PLL used. For control and protection of the systems, exact output and quick response of these quantities. The method of positive – sequence is able to run at unstable state, when the total grid synchronization. the PLL based control system are giving with the positive sequence estimation could without a doubt work in a real life application, when The positive-sequence phase angle is tracked within good.

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