SOLAR WIND HYBRID SMART GRID SYSTEM

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ABSTRACT: Efficient analysis and control of the electricity system is required for the complexity of the power grid combined with the continuous increase in demand for electricity. The development of the old system to the new intelligent grid increases that need because of the many sensors and actuators to be monitored and controlled, the new types of decentralized power sources to be integrated, and the new types of loads to be supplied while integrating human activity awareness into the intelligent grid. The system enables the monitoring, sharing and management of information and actions both in business and in the real world. The modelling and simulation is an inestimable tool in this context for the analysis of the system's behavior, the estimation of energy consumption and the prevision of the future. The smart grid for real power analyses was created using the MATLAB/SIMULINK approach. The real energy analysis gives you the exact idea to know the maximal allowable load range which can be connected to your corresponding busbar. In connection with analyzing small signals this article describes the change in the active power value with variable load angle. Considered the next generation power grid, the power and information bi-directional flow is used to create a broadly automatic power grid.

Keywords: *Smart grids; Smart meter; Photovoltaic systems; Wind power generation, Active power*

I. Introduction

The intelligent grid is the integration of traditional 20th-century power grid with the latest information and telecom technologies of the 21stcentury that make it possible for resource consumption, installation and management, energy generation and energy exchange to be efficiently utilised. In other words, energy and communication flows are bidirectional[1,2]. Many power companies worldwide have started installing renewable energy, such as solar and wind, in close proximity to consumers. In addition, homeowners began installing intelligent equipment and renewable energies in their facilities to generate and consume electricity efficiently. As smart grid concepts have become a quickly growing topic for research and development in the last years, smart grid users communicate in two directions through different wired and Wireless communication protocols such as Zigbee. Several software packages, including the Distribution Manager System (DMS), the Information System (GIS), Outage Managements systems (OMS), Customer Information System (CIS), and Supervision Control and Data Recovery System have been updated and many have been developed to support the new network operation, maintenance and management (SCADA). With intelligent power grid development, several newer technologies have emerged to reduce the number and process large volumes of data in the communication protocols. As shown in Fig. 1, the Internet of Things (IoT) is one of the newer options for the intelligent grid..

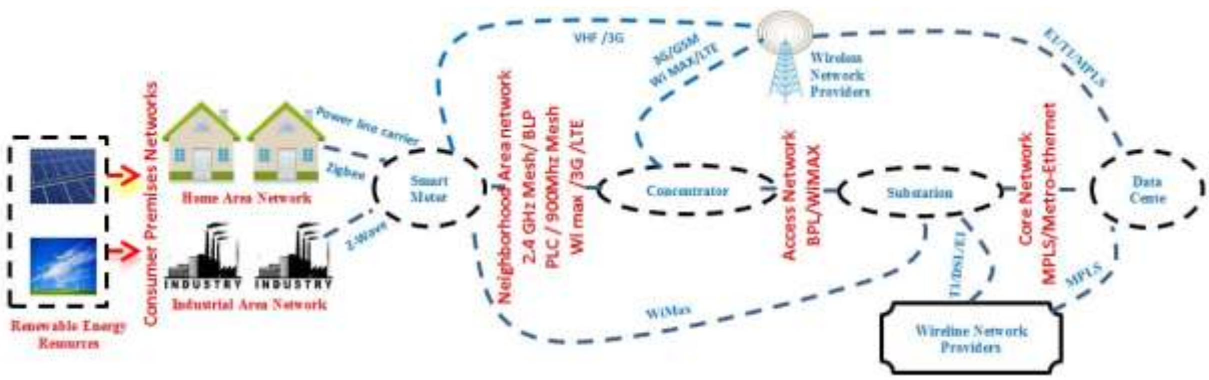

Fig. 1. Smart grid communications protocols

II. PROPOSED SYSTEM

- **Deflecting Non-Renewable Energy Sources:** - Present-day, the non-renewable electricity reassets, that's achieve from nature as a form of coal, fueloline etc, are exhaustive in nature and are depleting rapidity because of boom in population.
- **Hybrid Renewable Energy Systems:** - The electricity that's in-exhaustive in nature called renewable electricity gives as opportunity to non-renewable electricity reassets. Due to terrible effect of convectional electricity reassets at the environment, Renewable electricity assets grow to be famous now a day.
- **Renewable electricity gives as opportunity:** - The electricity that's in-exhaustive in nature called renewable electricity gives as opportunity to non-renewable electricity reasserts. Due to terrible effect of convectional electricity reassets at the environment, Renewable electricity assets grow to be famous now a day.
- **Development of photovoltaic machine: -** The intake of power era through photovoltaic machine has tempted sizable in latest years. The improvement of photovoltaic machine plant life consciousness directly to achieve the most gain of amassed sun electricity.
- **Solar PV System Implementation: -** In this method, we are model and control the renewable electricity primarily based totally sun p-v machine the usage of MATLAB environment. This grid related MATLAB version is studied below exceptional ranges of sun radiation and converting climate conditions.

System Analysis: - Finally machine stability, overall performance and temporary responses are analyzed. All simulation is executed in MATLAB 2016.

III. METHODOLGY:

METHODOLGY: Proposed model consist of a wind and a solar system working with a renewable power system. This system is connected to AC infinite bus as shown in fig .2. Solar system is a model in MATLAB 2016 With constant solar irradiation 900 and temperature 35. solar system is shown in fig.4 also wind system is built in MATLAB with a permanent magnet synchronous machine. This solar system and a wind system is connected at the PCC (POINT OF COMMON COUPLING) with non-renewable power system. The result from this model is given in this paper.

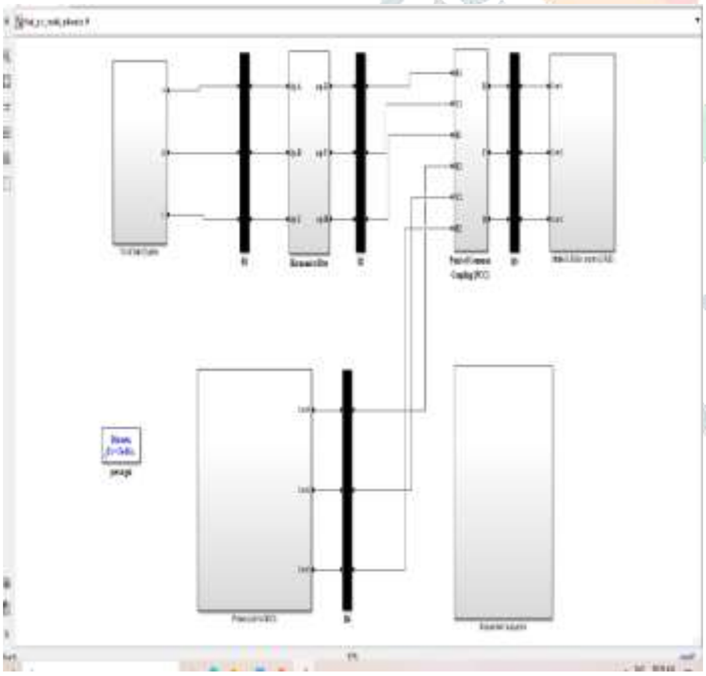

Fig.2 Propose Model of Hybrid Wind Solar System

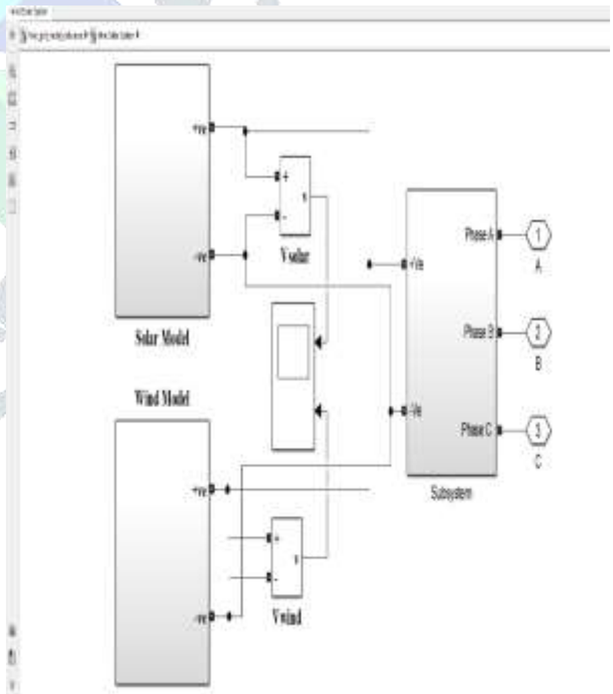

Fig3: Propose Model of Solar And Wind System

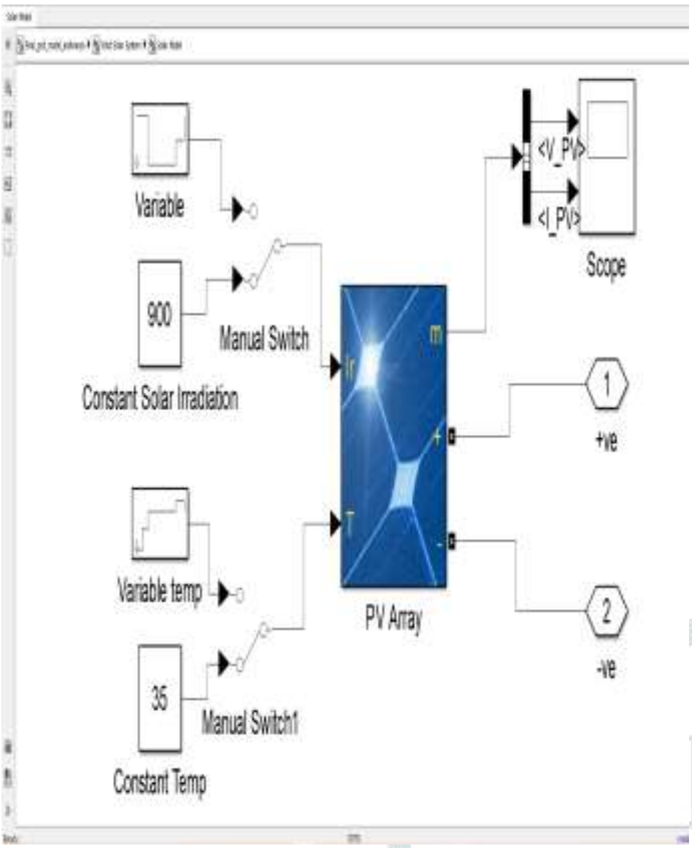

Fig 4: Solar Model

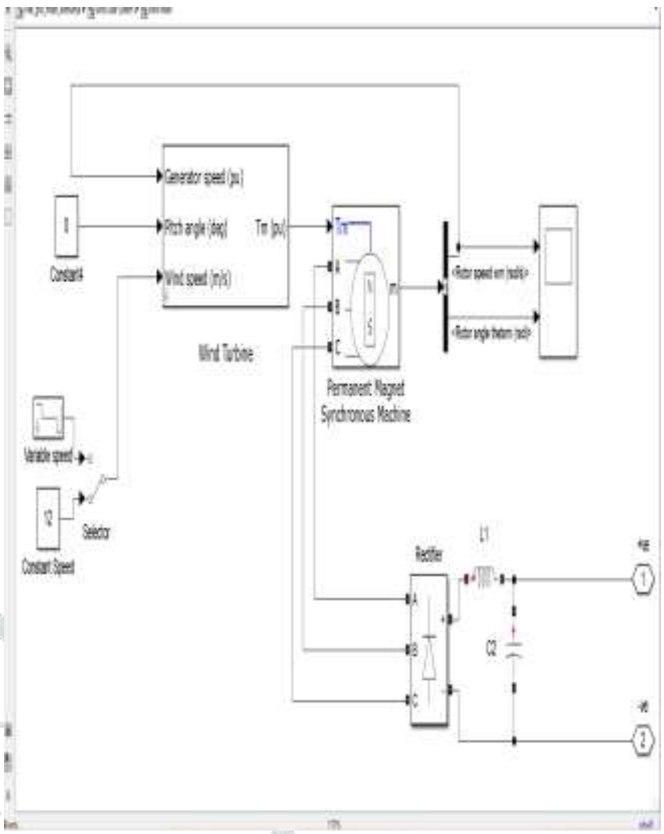

Fig 5. Wind Model

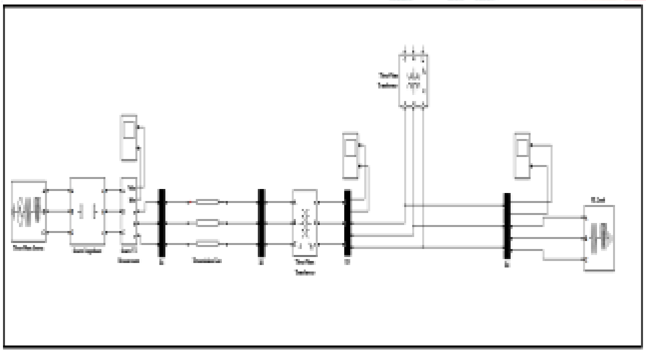

Fig 6. Renewable Power System Grid

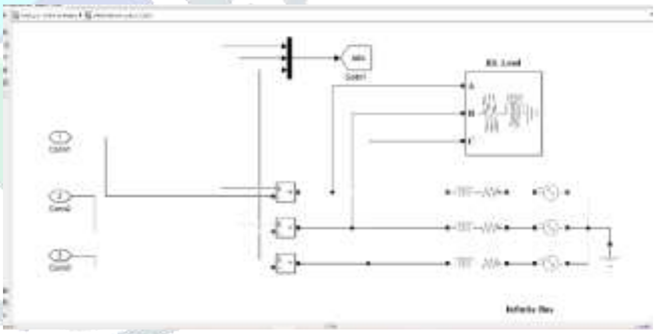

Fig 7. Infinite Bus (Load)

Table1: shows component and its characteristics

Sr No	Name of simulink block	Parameter
1	Three phase source	Phase to phase RMS voltage = 25 KV; Phase angle of phase A = 0 degree; Frequency =50 Hz; Internal connection of winding = star connected with ground; 3 phase short circuit level = 100 MVA; Base voltage = 25 kV; X/R Ratio = 7
2	Source Impedance	Resistance R =1 Ohm; Inductance L = 1 mH
3	Transmission line	Number of phase = 3; Frequency used for RLC specification = 50 Hz; Resistance per unit length: Positive sequence resistance r1 = 0.01273 Ohm/Km; Zero sequence resistance r0 = 0.3864 Ohm/km; Inductance per unit length: Positive sequence inductance l1=0.9337mH/Km; Zero sequence inductance l0 = 4.1264Mh/Km Capacitance per unit length: Positive sequence inductance C1 = 12.74Nf/Km; Zero sequence inductance C0 = 7.751nF/Km; Line length = 100 Km

4	Three phase transformer	Winding connections Primary winding = Delta; Secondary winding = star with ground; Nominal power = 2 MVA; Frequency = 50 Hz; Primary winding parameters: V1=25 kV; R1= 1.875Ohm; L1=0.23873 H Secondary winding parameters: V2=33 kV; R2=1.089 Ohm; L2 = 0.13866 H
5	RL Load	Nominal phase to phase voltage = 1000 V; Nominal frequency = 50 Hz; Active power = 10 KW; Inductive reactive power = 100 Var

IV. Result:

A result Shows That Voltage and Current Waves At a various BUS, BUS 1 Shows Wind and Solar Voltage and Current Characteristics. BUS 2 Shows Harmonics Waveform in Voltage and Current of Solar Wind System, BUS 3 Shows Point of Common Coupling and BUS 4 Shows Power System.

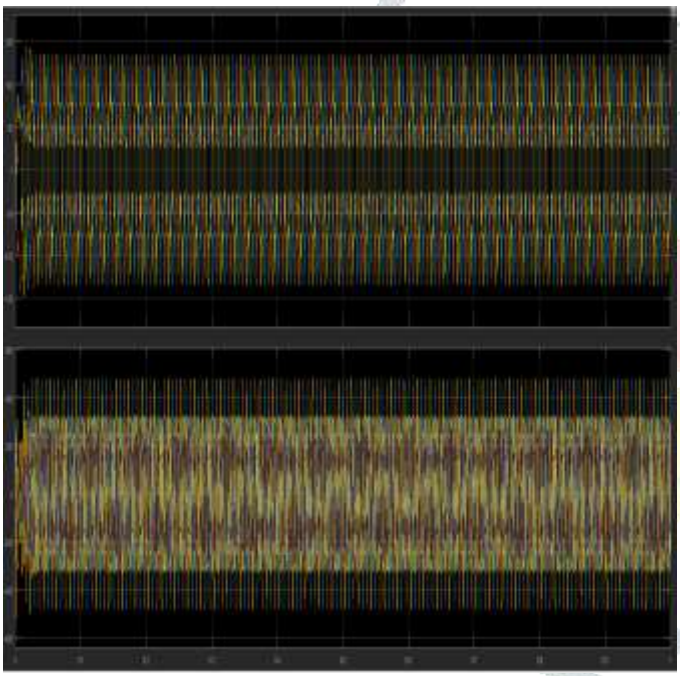

Fig.8 Three phase voltage and current waveform after inverter output at Bus bar 1

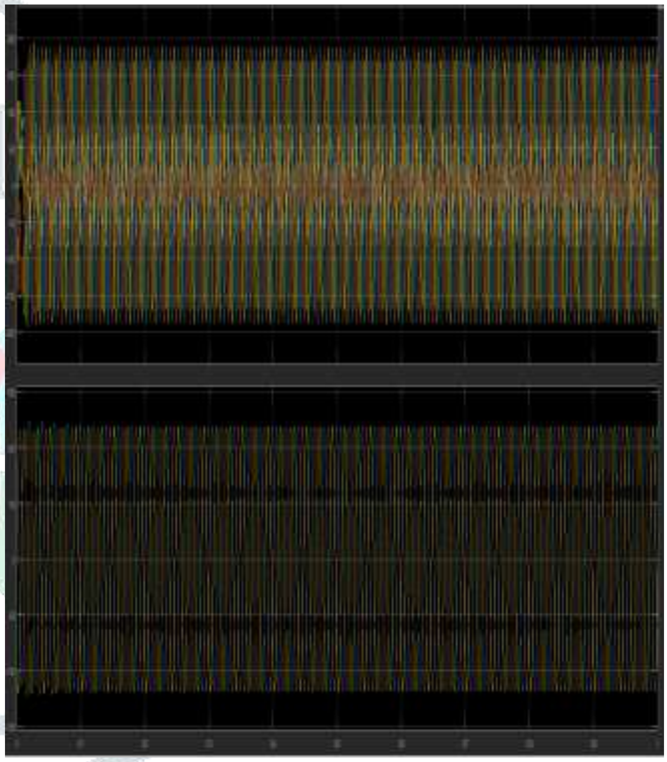

Fig.9 Three phase voltage and current waveform after LC filtering at Bus bar B2

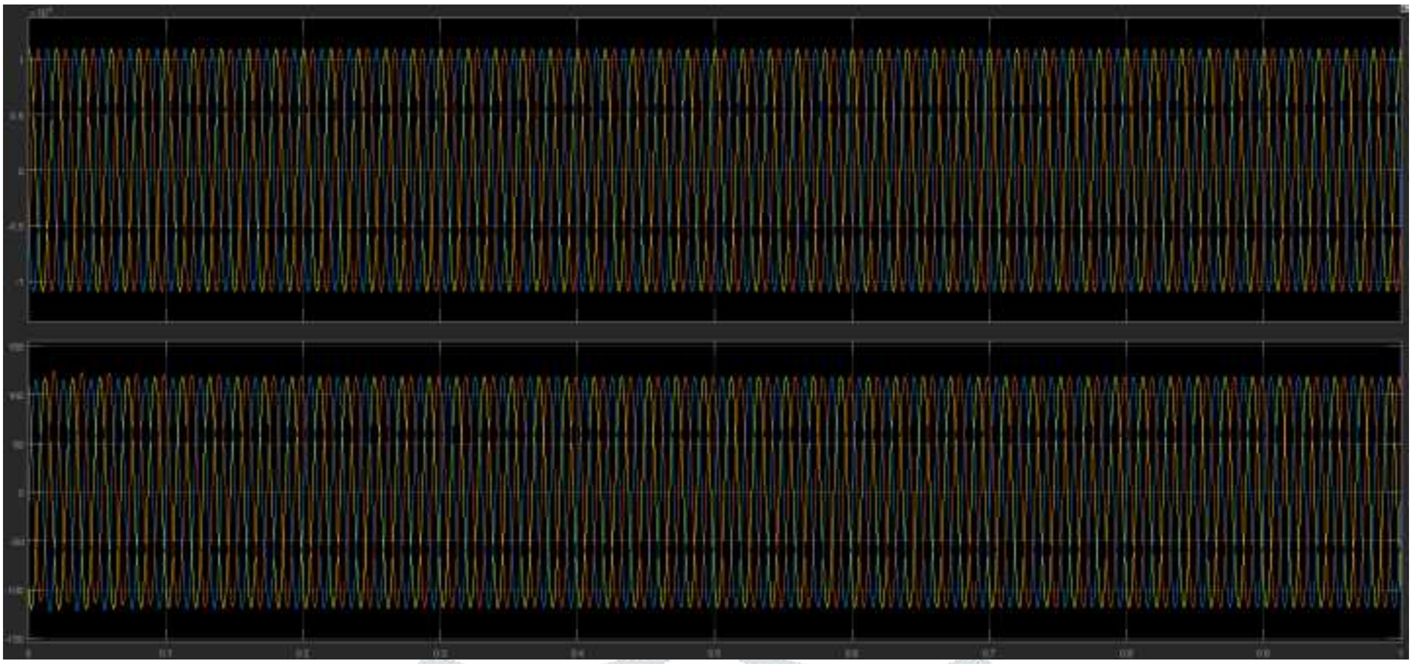

Fig.: Three phase voltage and current waveform at common coupling point or at AC grid system at bus bar 3

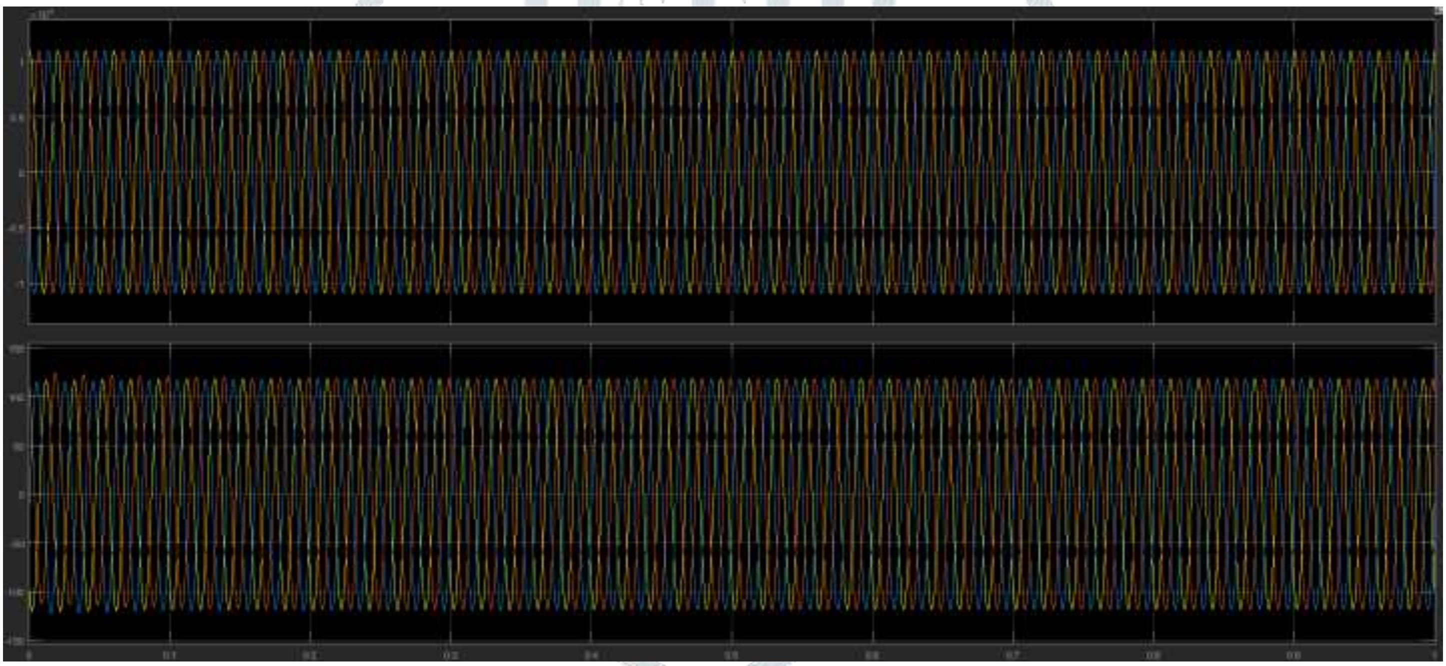

Fig.: Three phase voltage and current waveform of power system at bus bar 4

V. CONCLUSION:

For the general configuration, a novel topology of multi-level inverter was introduced to model the grid interface of solar arrays. For the distribution network, two segments of distribution lines with three-phase resistive load were developed to simplify the real distribution network. For MATLAB simulation results temperatures and solar irradiances data are used which are displayed by wave forms shown in Fig. The P-V and I-V characteristics of solar module are mostly affected by temperature and solar irradiance variation. When solar irradiance is changes which affected by condition of environment, the point at which maximum power is obtain is changes. Also, Wind output is varying according to changes is wind speed. We successfully Analysis of grid connected solar PV and wind hybrid system, Rating calibration of solar PV system for different grid voltage level and Synchronization of Solar PV and wind system with AC grid.

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