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DESIGN AND IMPLEMENTATION OF ZVS GRID CONNECTED DC/AC CONVERTERS USING FUZZY LOGIC CONTROLLER FOR THREE PHASE MICROINVERTER APPLICATION

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Abstract: This project is designed for micro inverter application. The three phase four wire system is implemented for increasing the efficiency of the input. The three stage control loop is implemented for the control operation of three phase voltages. Generally the input of PV voltage is fed into the LC resonant converter; the MPPT is employed for maintaining the constant voltage to the network. The converter output is fixed DC which is given to the DC link, the three phase DC to AC converter is to produce the 3 phase AC supply. The triple loop control is to improve the system response. A Fuzzy Logic Controller is used in triple loop control of inverter for improving the efficiency. Finally the output is simulated by the Matlab / simulink simulation software.

Keywords: MPPT, LC, Fuzzy logic controller

I. INTRODUCTION

The increasing number of renewable energy sources and distributed generators requires new strategies for the operation and management of the electricity grid in order to maintain or even to improve the power-supply reliability and quality. Solar energy offers extraordinary merits including environmental neutrality, unlimited availability and low cost capable of competing with conventional sources due to technology and mass production. Over the last 10 years, the photovoltaic industry has averaged an annual growth rate of over 25%.In addition, liberalization of the grids leads to new management structures, in which trading of energy and power is becoming increasingly important.

The power-electronic technology plays an important role in distributed generation and in integration of renewable energy sources into the electrical grid, and it is widely used and rapidly expanding as these applications become more integrated with the grid based system. During the last few years, power electronics has undergone a fast evolution, which mainly due to two factors. The first one is the development of fast semiconductor switches that are capable of switching quickly and handling high powers. The second factor is the introduction of real-time computer controllers that can implement advanced and complex control algorithms.

These factors together have led to the development of cost-effective and grid-friendly converters. The micro inverter has witnessed recent market success due to unique features such as improved energy harvesting, improved system efficiency, lower installation costs, plug-N-play operation, and enhanced flexibility and modularity. Micro inverters with high-frequency transformers can be grouped into three architectures based on the dc-link configurations: dc-link, pseudo-dc-link and high frequency ac.

II. EXISTING SYSTEM

In the existing system consists of novel micro inverter for a single-phase grid-connected photovoltaic (PV) system is implemented. The micro inverter consists of a step-up dc–dc converter using an active-clamp circuit with a series resonant voltage doubler and a high-efficiency inverter with single-switch modulation step-down converters. The active-clamp circuit provides zero-voltage switching (ZVS) turn-on, recycles the energy stored in the leakage inductance of the transformer, and limits switch voltage stress. Moreover, to remove the reverse-recovery problem of the rectifier diodes, series-resonant voltage doublers are used. Single switch is modulated at the switching frequent without a shoot-through problem. A modified controller is also adopted to achieve fast output control. This PV micro inverter has the structure to increase the power losses.

III. PROPOSED SYSTEM

The three phase four wire system is implemented to increasing the efficiency of the input. The three stage control loop is implemented for the control operation of three phase voltages. Generally the input of PV voltage is fed into the LLC resonant converter, the MPPT is employed for maintaining the constant voltage to the network.The converter output is fixed DC which is given to the DC link, the three phase DC to AC converter that is inverter is used to get the 3phase AC supply. The triple loop control is improved the system response.

IV. BLOCK DIAGRAM

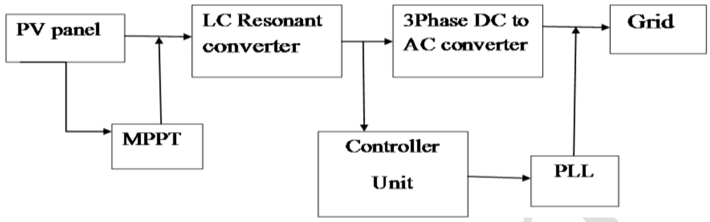

Fig 1: Block Diagram

PV panel is the input supply and MPPT draws maximum power from PV panel.LC resonant converter for resonance conversion. In the Converter unit ,Fuzzy controller used for improve efficiency.

V. SIMULATION CIRCUIT

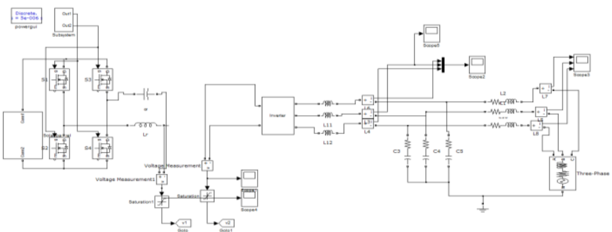

Fig 2: Simulation Diagram

VI. SIMULATION RESULTS

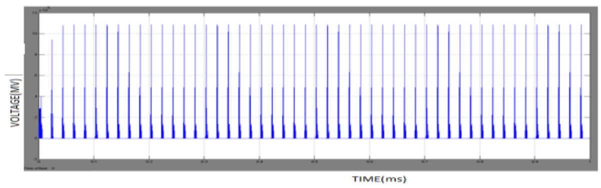

Fig 3: Saturated output from the Resonant Converter

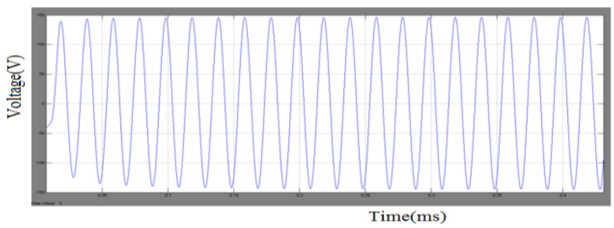

Fig 4: Single Phase Output From The Inverter

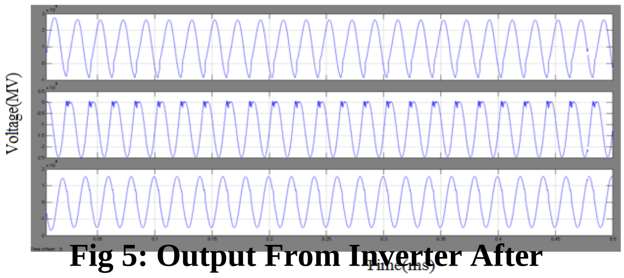

Fig 5: Output From Inverter After Looping

VIII CONCLUSION AND FUTUREWORK

In this project is designed partially up to three phase converter module in the input of this concept is solar, it is a renewable resource so easily available, the solar model is simulated at the required blocks the solar irradiation and temperature, extracting energy from solar panels that in the form of variable Direct current then it convert to the fixed direct current by MPPT then the converted output is given to the resonance converter, it plays a key role to the system. Fuzzy logic is used as a controlled methodology. The 3 phase inverter is used in the project and it gives the 3 phase sinusoidal output waveform. Future work of this project is to designed the control loops and for fed to the application and research. The fuzzy logic control will implement for the whole control operation and the 3phase input required applications. The future work depends on the expand section like control loop of the utilization unit. The frequency ,voltage, current control states to be designed.

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