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Analysis of MOSFET Based Inverter Protection System Using PIC Controller

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Abstract: **These topic basically illuminates to develop the protection system for inverters using PIC Controller. The current system consists of MOSFET for the high power inverters and according to the simulation results hardware implementation is done with controller board. For the reference values for PIC code generation, and If any fault occurs in the system then the system will be protected. PIC board can be interface with the hardware and in software of PIC program can be developed for the feedback of the protection system. However the system which can be developed in hardware or power circuit can be modify also with other power ratings and according to that PIC controller will work and the system for the protection of the power inverters can be easily done.**

Keywords: **PIC Controller, Peak Amplitude, Conducting Current, Power Factor**

I. INTRODUCTION

Basically in this module block power is being transferred towards semiconductor devices according with proper frequency and here MOSFET is being taken as a semiconductor switch and results are being obtained on the basis of the IGBT results. Load is connected towards the circuit and controller is interface with circuit to provide gate driver pulses to the IGBT gate terminal and continuous PFC is there to maintain the source.

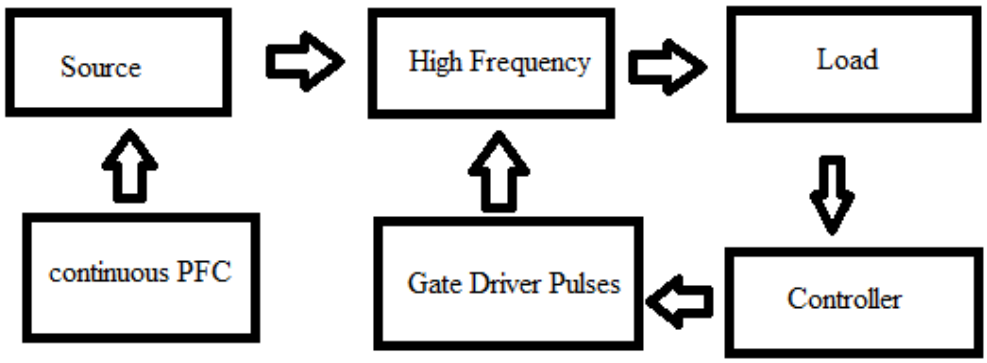

Fig. 1: Block diagram configuration.

Basically in this high power inverter module, voltage level should be maintained so that other fault level can be decreased. According to parallel load connection, inverter gate drive circuits will change pulse for the MOSFET.

We can simulate this inverter circuit in single phase and three phase also. In controller section PIC Controller is used so that perticuler limit for the peak value should be decided and according to that if fault goes above or below that limit the whole circuit will open so that components used in the circuit will be safe and protection of circuit can be easilly developed.

Without use of snubber circuit, spikes in the voltage and distortion in the current waveforms can clearly notify and that can be minimized only by adding snubber circuit. Sharing resister are also to be added in the circuit for the balancing of voltage levels. Voltage monitoring and digital control system can be used also but microcontroller is more user friendly than all other controller systems in recent days.

II. SYSTEM MODEL AND ASSUMPTIONS

Programming and code generation in the microcontroller is according to the fault level and other parameters which are being changed during fault according to the system.

Here as a semiconductor device MOSFET is being used because High Frequency is required for high power inverters which is around 12Khz. PIC controller consist of ADC, DAC, Buffer and some other ports are there for the analysis of the protection system for high power inverters. The voltage waveform across the MOSFET and here in this system in single phase four MOSFET are connected in one lag, it means two MOSFET are in series in one lag so during positive half cycle four MOSFET will conduct and negative half cycle other four MOSFET will conduct in single phase system. Here the same voltage across NOSFET waveforms we can get in hardware also which can be taken as a reference for the controller section. If we are using two IGBTS are in series then the results of that two MOSFET will be almost same because they are blocking same voltage but the voltage will get divide so as many MOSFET used in a system we can say that the voltage will get balanced, so the load or stresses on each MOSFET will get reduced.

So according to the simulation and hardware results are being observed on simulation basis also and according to microcontroller bases. By varying the parameters current and output voltage waveforms can also be varied.

III. SIMULATION RESULTS

Here basically in simulation results various types of topology results are being observed and according to that results hardware description is done and the performance of MOSFET is being observed by the simulation based results so that protective system can done by controller interfacing.

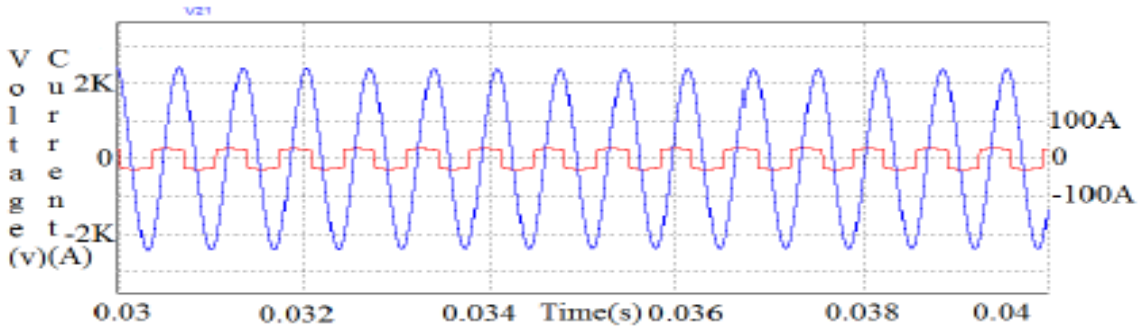

Fig. 2 Output Voltages and Current Variation

here in Fig.2 Voltage and Current variations are being observed as load changes and in Fig .3 Voltage results of the DSP controller final is obtained here basically result is required like shown in Fig.3 because controller will fix one limit on the peak side so that any fault occurs in the system can minimized and system can be protected.

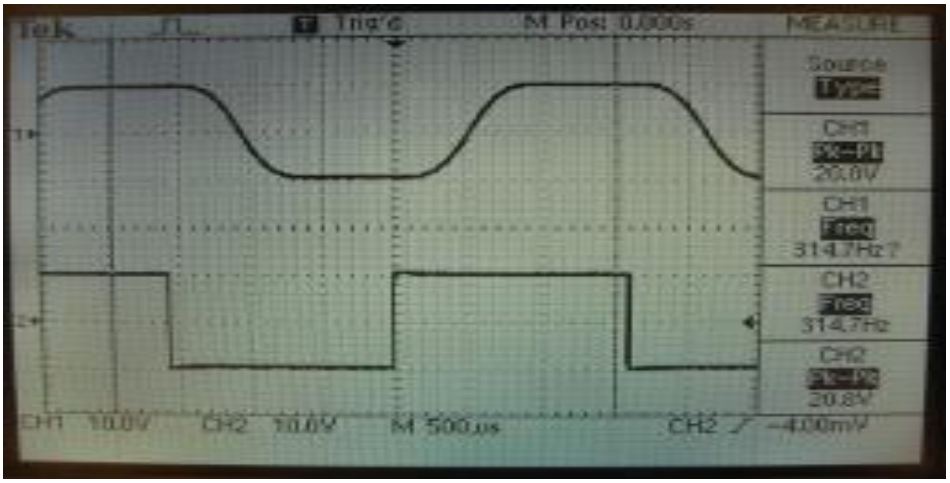

Fig. 3 Voltage Controlled By PIC Controller

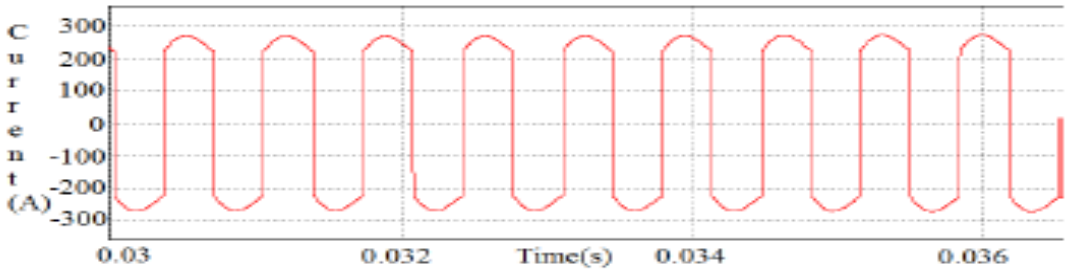

Fig. 4 Conducting Current

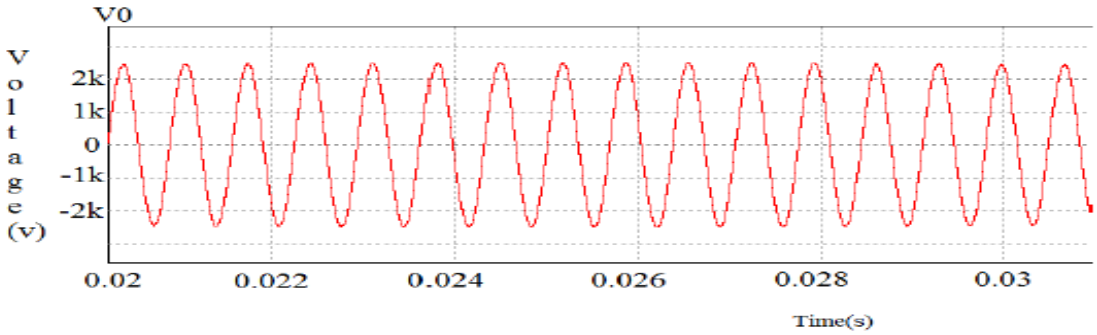

Fig. 5 Controller with Interfacing Output Voltage

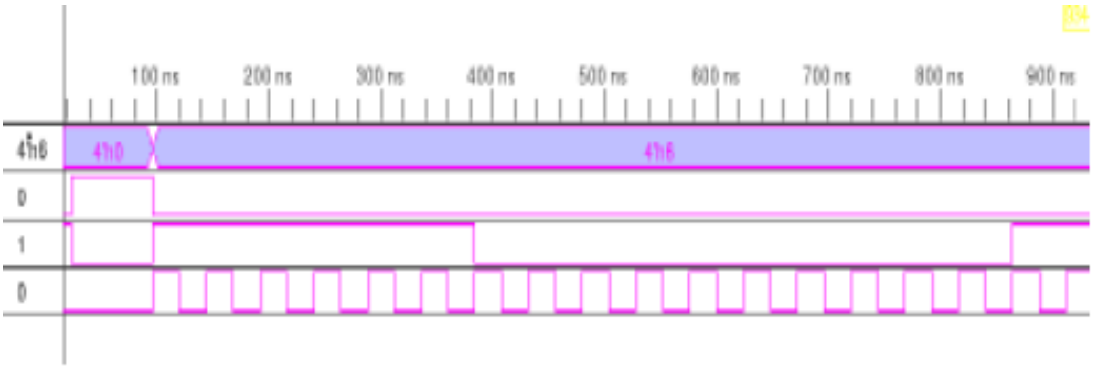

Fig. 6 Microcontroller Results of Duty cycle Of 75 Percentage

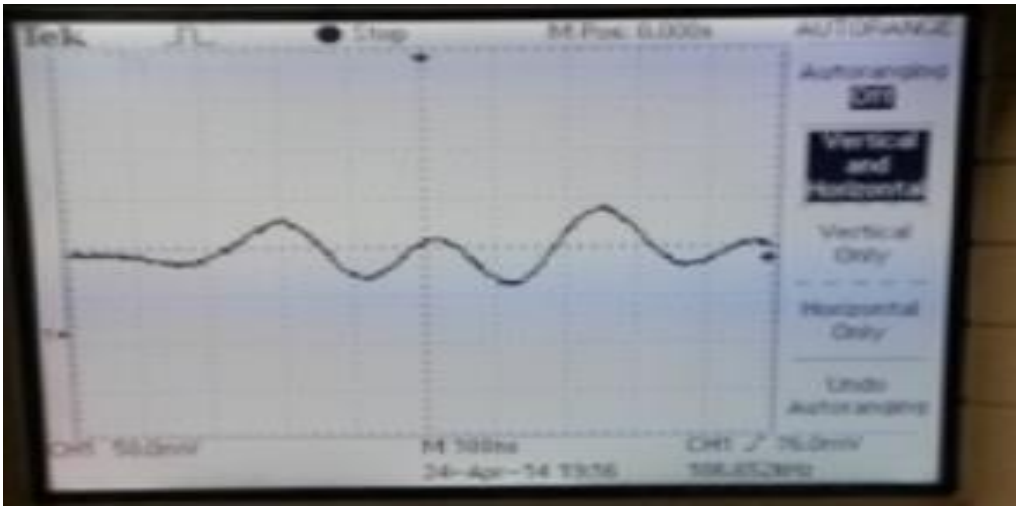

Fig .7 Hardware Voltage Result on the basis of Simulation Results

Here in Fig.7 Hardware results are being obtained as same as the simulation results to develop protective based systems.

IV. CONCLUSION

Here from this concept we can conclude that protection system for the high power inverters can be implemented by sensing the voltage across MOSFET, snubber voltage and current waveforms in Controller and according to that result hardware system is also being implemented.

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