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Extenuation Harmonic Using Hybrid Filter

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ABSTRACT:
Hybrid filter are extensively used for elimination of voltage and current harmonic and to compensate reactive power for linear-nonlinear load. Also input power factor is improved. So, hybrid filter is used as a practical solution to solve the electrical power quality issues. Hybrid filter consist of active filter and passive filter. Due to harmonic there are many problems in electrical system like torque pulsation in motor, heating of equipment etc. The proposed system of hybrid filter has been overcome the disadvantage of active filter and passive filter. Approximate choice of passive filter being presented in this thesis which combine with active filter an eliminate higher order harmonic. A simple mathematical design procedure is derive for
the passive filter. In this thesis, power quality improvement based on hybrid filter analyze for various nonlinear load.

KEYWORDS: Hybrid filter, Active filter, Passive fileter, Non-linear load.

I. INTRODUCTION

Installing capacitor banks are commonly used for power factor improvement. Good quality electric power if the value of pf> 0.85, a constant voltage even though the loads are variable, constant frequency, sinusoidal waveform (not distorted) [1], [2], [3].

In today's word, increasing the use of non-linear loads day by day, having a power quality Problem which is the challenging task to resolve the power quality problems, To solve this problem industry were use passive filter, having a drawback like necessity of isolated filter for each harmonic current and having limited characteristics of filtering, the negative effect cause the parallel and series resonance between the grid and the filter. These disadvantages of passive filter are compensating by series active power filters but it is cost and having complex structure. To overcome all this problems the hybrid power filter are develop by using the advantage of active and passive filters.

II. Block diagram

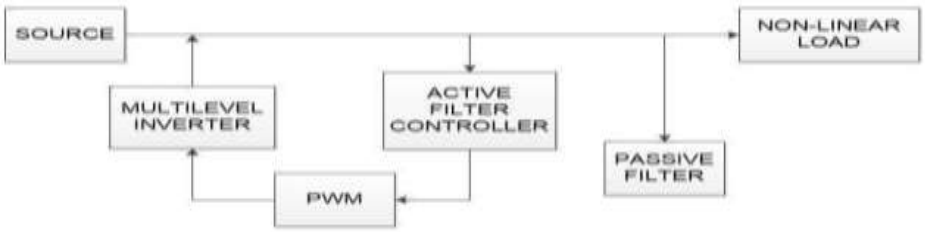

Fig 1 Block Diagram

As shown in above figure block diagram consist of three main parts:

- Sources
- Non-linear load
- Filter

1. Passive filter
2. Active filter controller
3. PWM

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Three-phase A.C. supply is given as a source. Sources are the regions or location or events which cause the unwanted variation of those parameters. The non-linear load is supplied by the source. They produce harmonic in the supply voltage and current when non-linear load connected then the odd number harmonics are present become poor quality of power and harmonic distortion consider. Passive filter is combination of inductor and capacitor. They connected between source and load. It provides low impedance path for the higher order harmonics. It also gives reactive power compensation to the system. The active filter controller is the part of the active filter controller. It provides the control signal. It is used compensate load current. The control signal is applied to the PWM. In PWM signal is compared with the carrier wave and produce gate pulses for the multi-level inverter. The gate pulses are given to the multilevel inverter. They are main choice in the medium voltage and high power control. So, multilevel inverters are reduce the total harmonic distortion.

III. SIMULATION

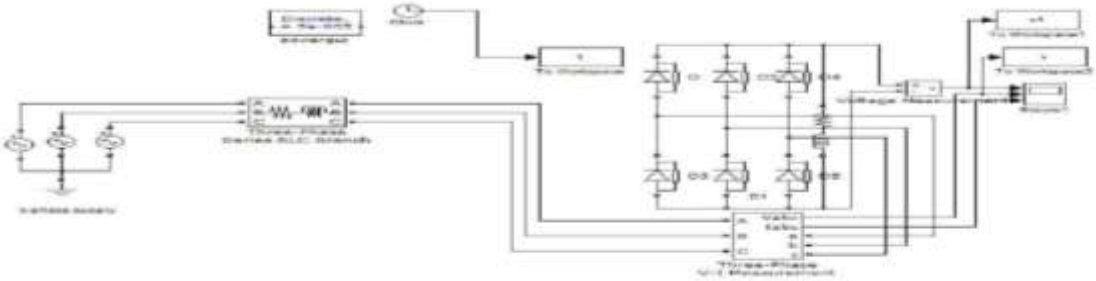

Fig 2 Three phase bridge rectifier circuit

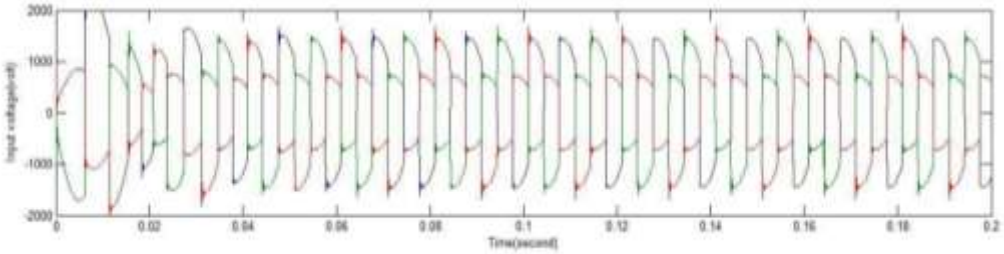

Fig 3 Input voltage waveform (Without filter)

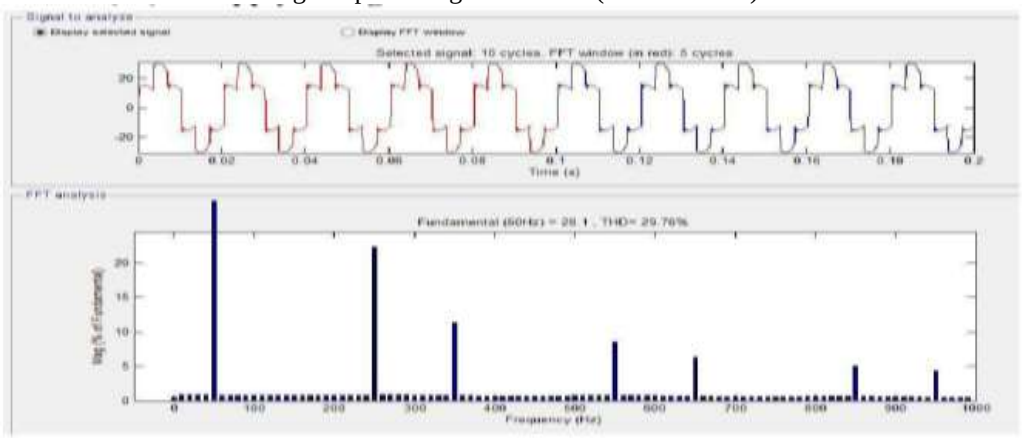

Fig 4 THD (%) of supply voltage without filter

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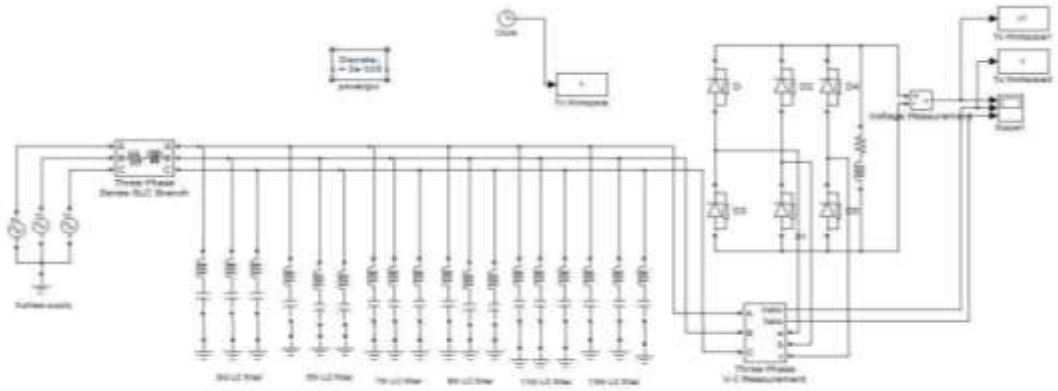

Fig 5 Shunt Passive filter connected to circuit

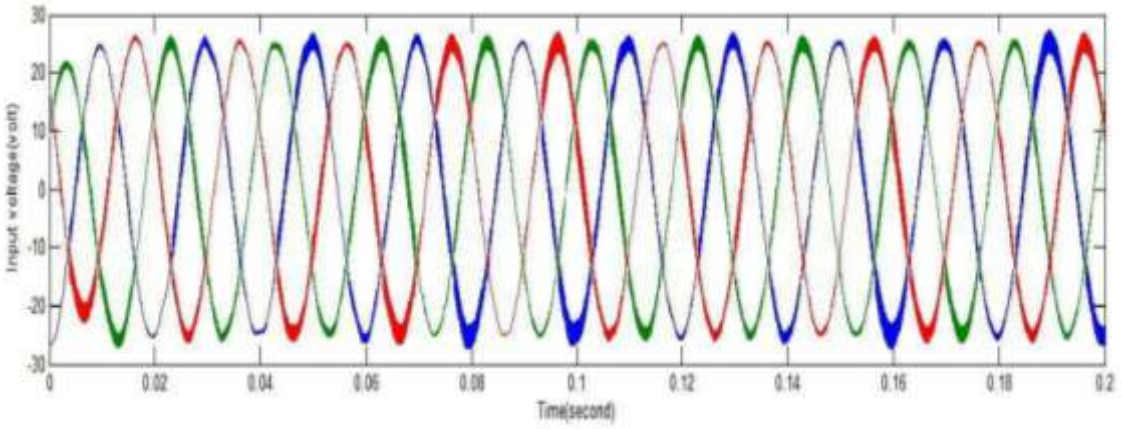

Fig 6 - Input voltage waveform (With filter)

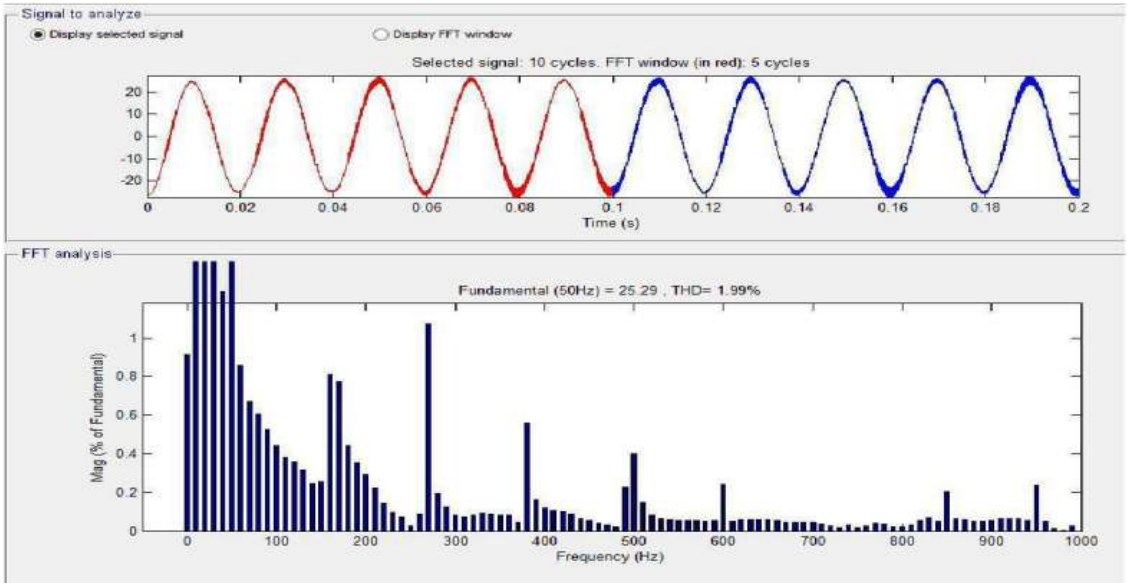

Fig 7 - THD (%) of supply voltage with passive filter

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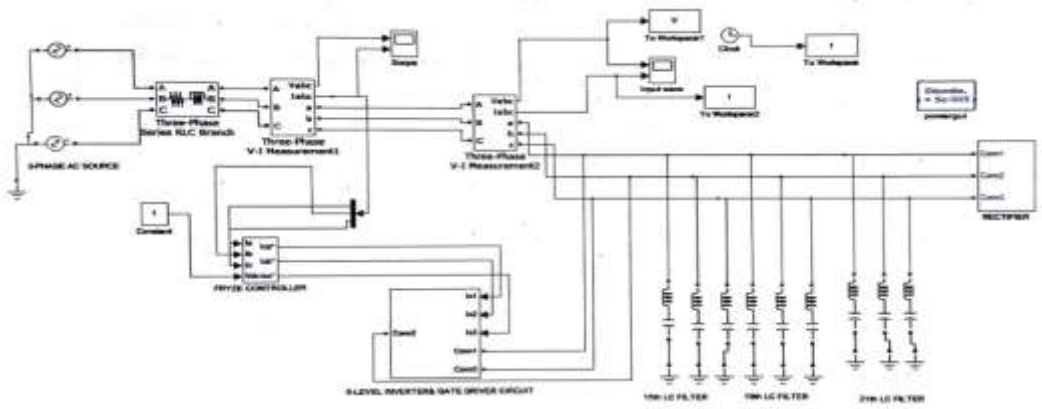

Fig 8 – Hybrid filter connected between source and load

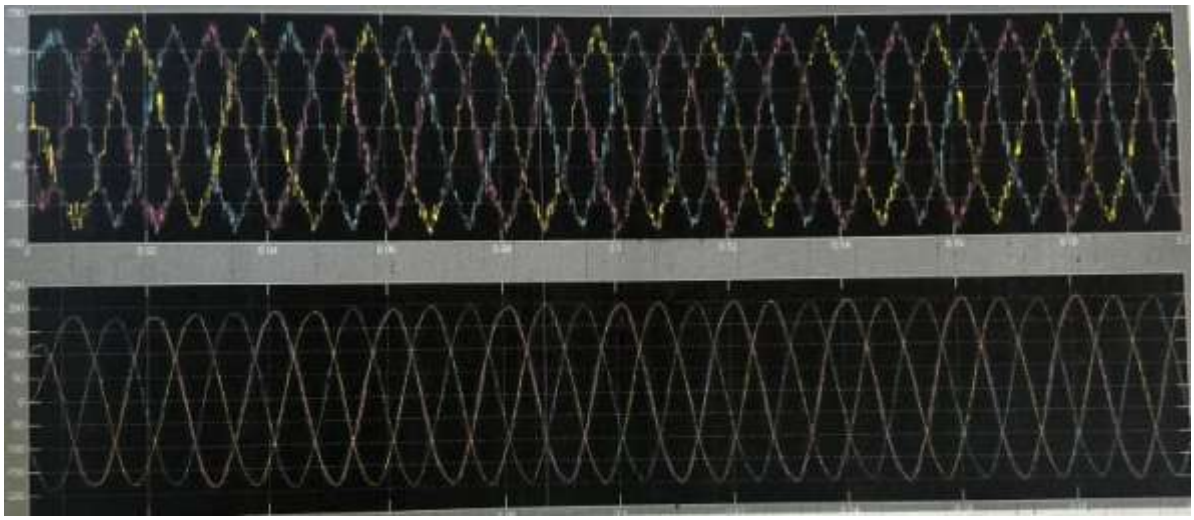

Fig 9 – Hybrid filter connected between source and load

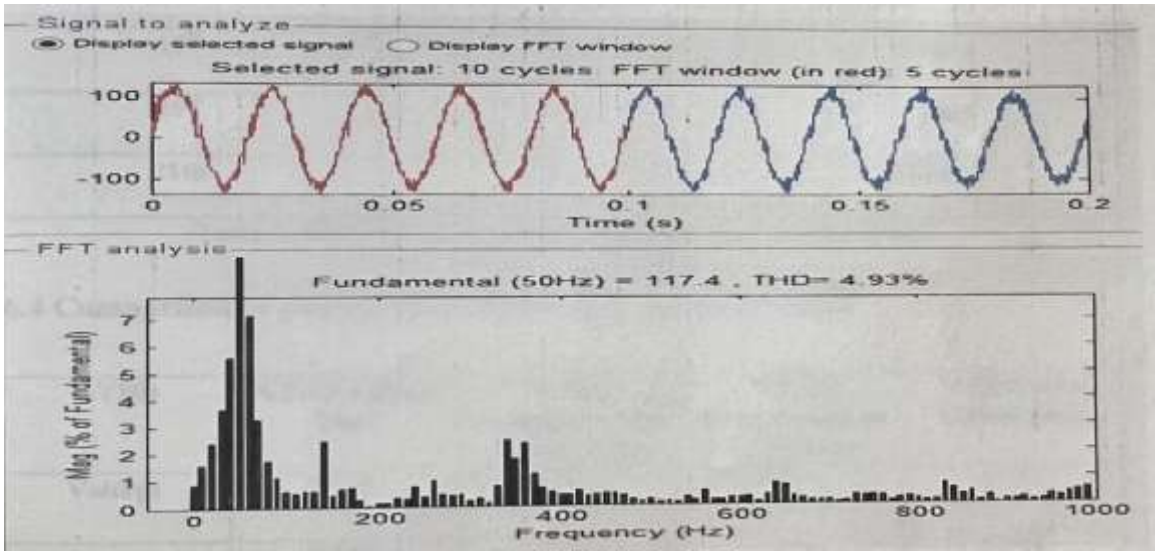

Fig 10 – %THD of supply voltage with hybrid filter

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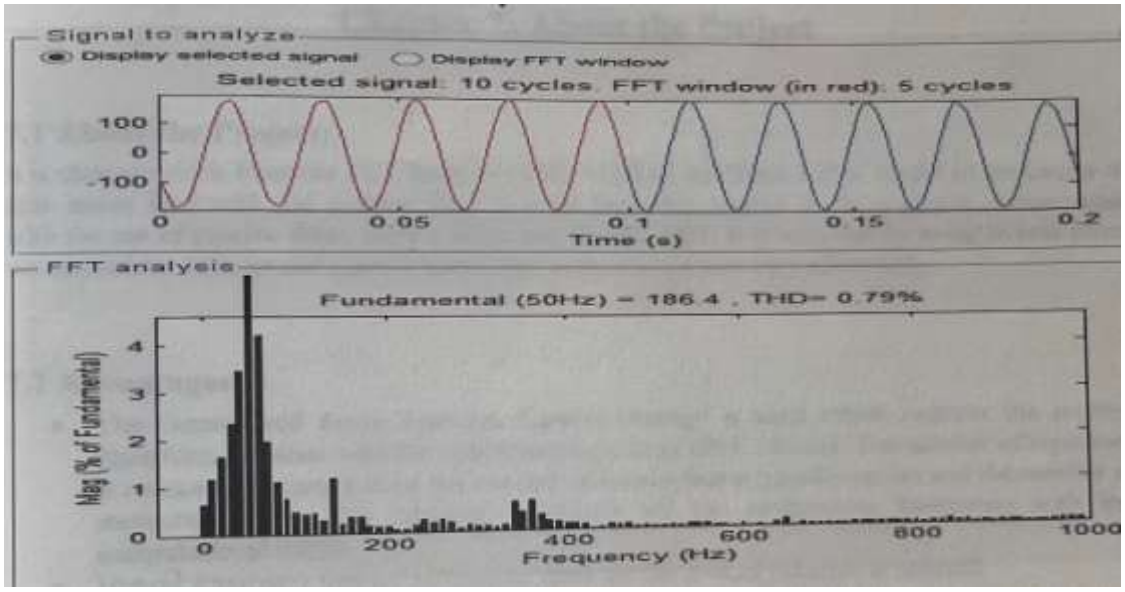

Fig 11 – %THD of supply current with hybrid filter

IV. CONCLUSION

In this paper, with use of hybrid filter we can reduce voltage and current harmonics effectively. In active filter we use current control strategy which reduces the current harmonics. The passive filter reduces the voltage harmonics. So it is very efficient and economical way to reduced the harmonics and provides the harmonics free supply to the load.

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