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# MODELLING AND SIMULATION OF MULTIPULSE METHOD USING DIODE AND THYRISTOR BRIDGE RECTIFIER IN MATLAB AND SIMULINK

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## ABSTRACT

This paper modeling and simulation of multipulse method using diode and thyristor bridge rectifier presents to reduce the harmonics contents from the device through the method of multi pulse technique. These harmonics produced in the data c For reduce the total harmonic distortion of Input current and improves the power factor. Results of the each 6,12,18,24,30,36,48 are checked to make the particular constellation cost-effective for high power application in power industry. By using MATLAB/SIMULINK these modeling are done.

**KEYWORDS**: Multi-pulse method, Total harmonic reduction (THD), Power factor, Input current, diode, register, rectifier.

## INTRODUCTION

We use this method for high power application. For improving the performance of the system multi-pulse method is suitable. For system hp>150 multi- pulse is cost- effective than any other method to reduce harmonics from system. The input current have harmonics presence which is observed by the following equation $X = YZ \pm 1$

X Harmonic order
Y integer value
Z no. of rectifier

The results are obtained for reduction of THD from multi pulse method. From supply current harmonic distortion is achieved [1] in this reference harmonic content can reduce by many technique and Simulation is done for same type of load . We use Passive filters in many research works for reduction of THD but by this method we suffer from resonance problem and it have very heavy filters so its cost is very high[1],[5]. The hybrid solution of both filters used for high power application so its construction is very complex. [4]. In this project work , phase shift transformer used and it placed between the supply side and load side of the circuit. We shown in this work Effect of increasing the number of pulse in multi-pulse converter on input supply current.

Multipulse Method- Pulse number defined as The number pulses in the dc output voltage within one time period of the ac source voltage [3] AC-DC converter which based on the concept of multi-pulse namely 6,12,18,24,30,36,48 pulses applied for high power application. The Zig-Zag transformer with diode and thyristor are connected with pulse.

| No. of Pulses | Harmonic Order |
|---|---|
| 6 | 5,7,11,13,17,19……. |
| 12 | 11,13,23,25,35,37…….. |
| 18 | 17,19,35,37,53,57…… |
| 24 | 23,25,47,49,71,73…….. |
| 30 | 29,31,59,61,89,91….. |
| - | - |
| 48 | 47,49,96,97,143,147. |

***Table 1: Harmonic order dilute by respective Multi-Pulse Converter.***

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## SIMULATION MODELING AND RESULTS

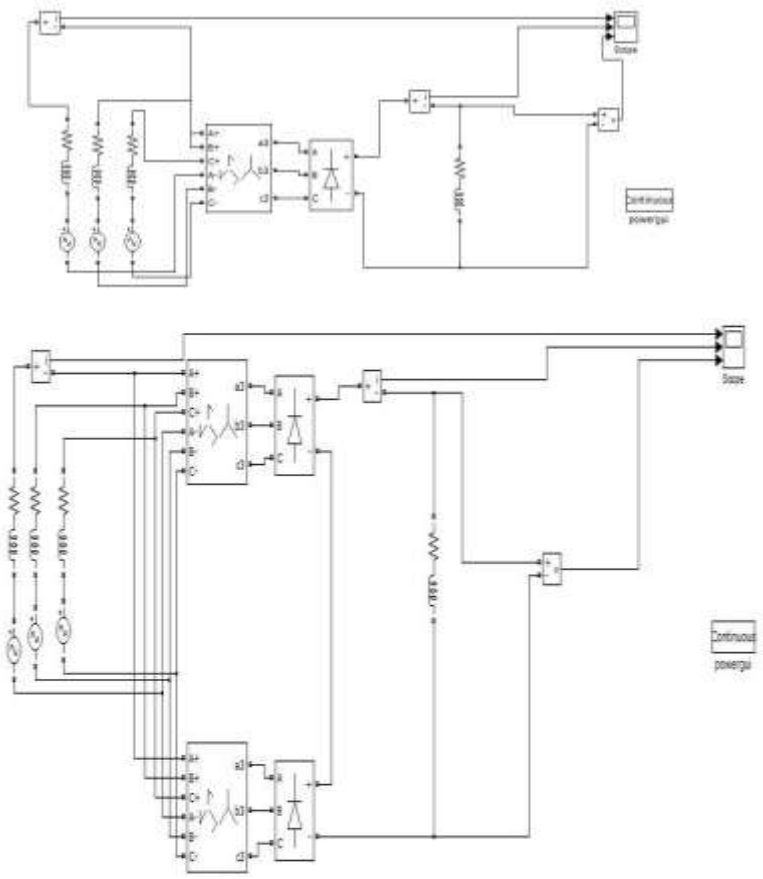

***Figure1: 6 & 12 pulse converter***

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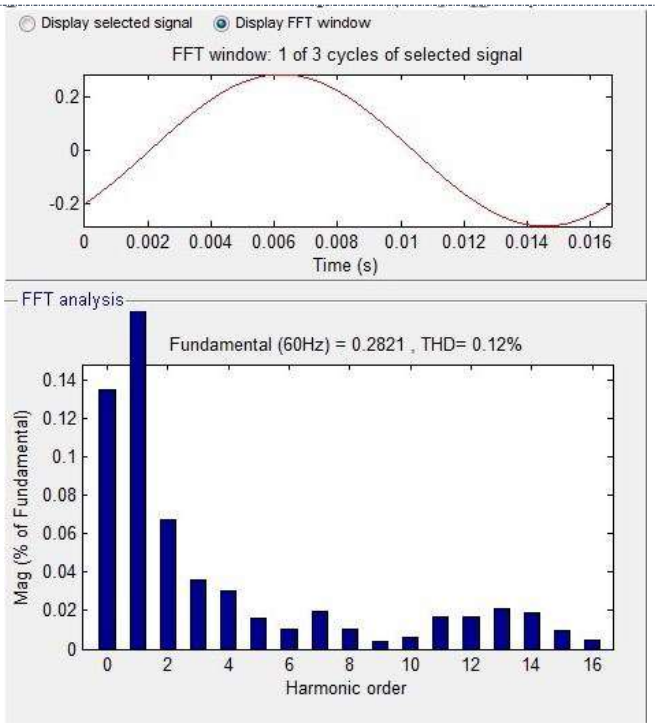


***Figure 2: THD for input current of 12 pulse converter***

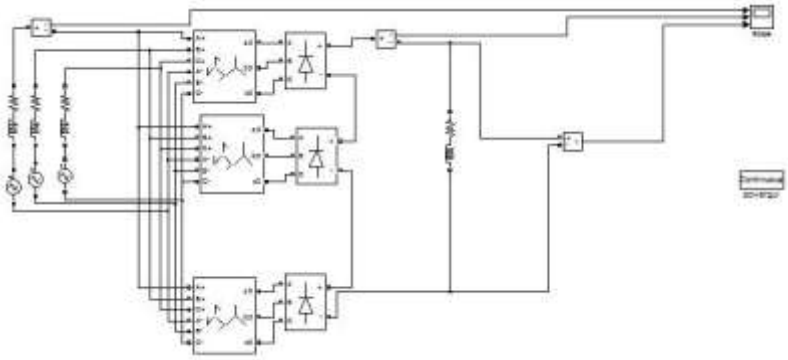

***Figure 3: 18 pulse converter***

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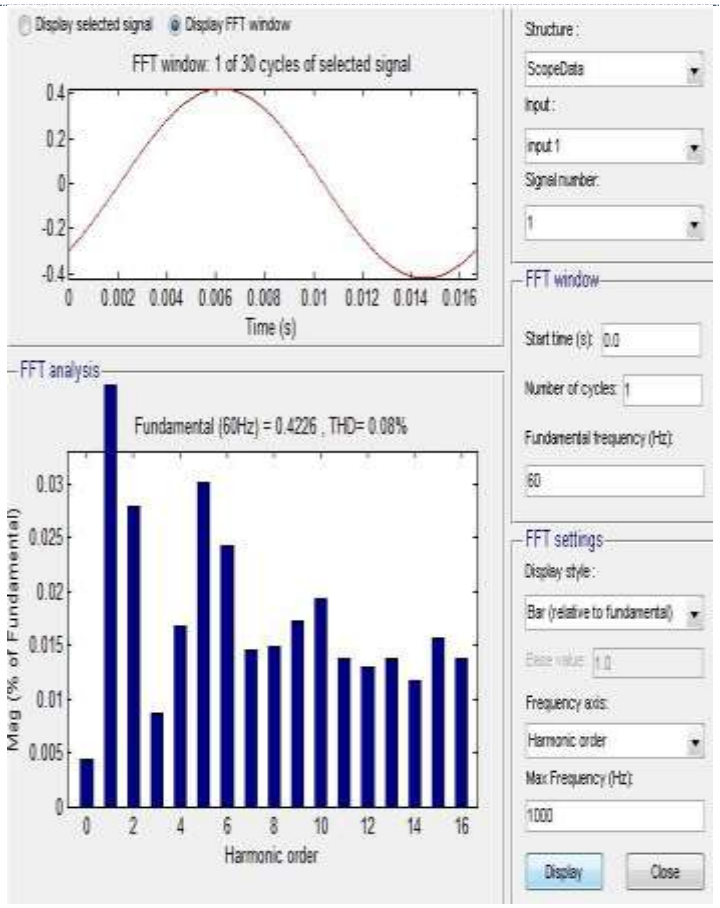


***Figure 4: (a) & (b) 18 pulse converter & THD for input current***

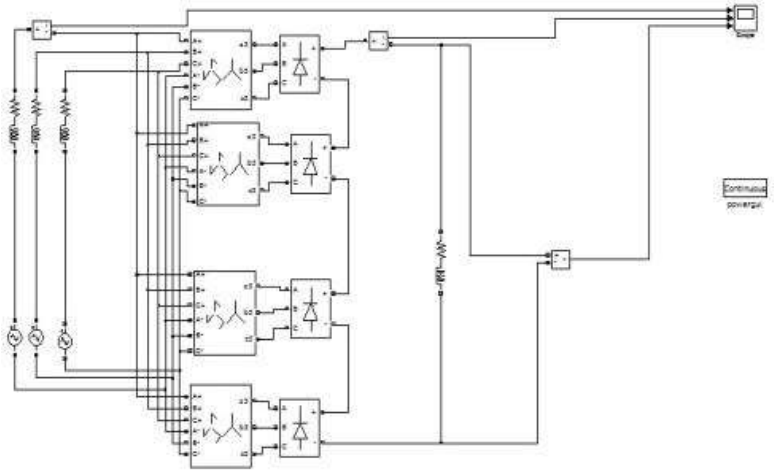

***Figure 5: 24 pulse converter***

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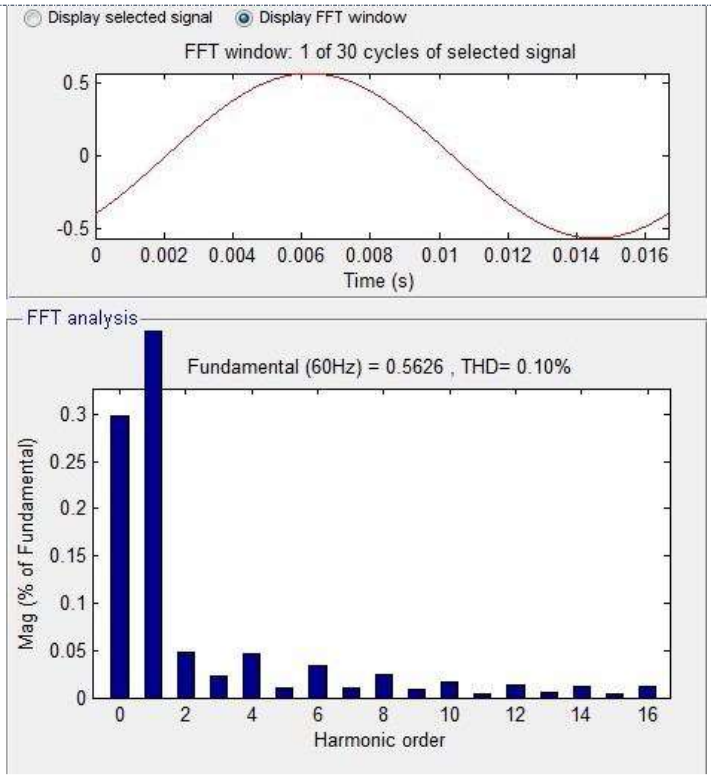


***Figure 6: (a) & (b) 24 pulse converter & THD for current input current***

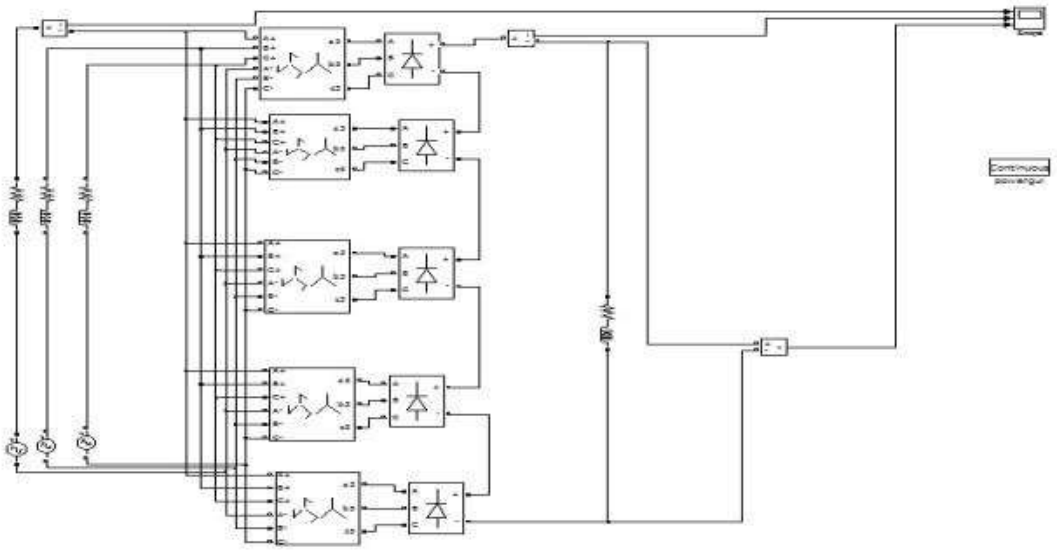

***Figure 7: 30 pulse converter***

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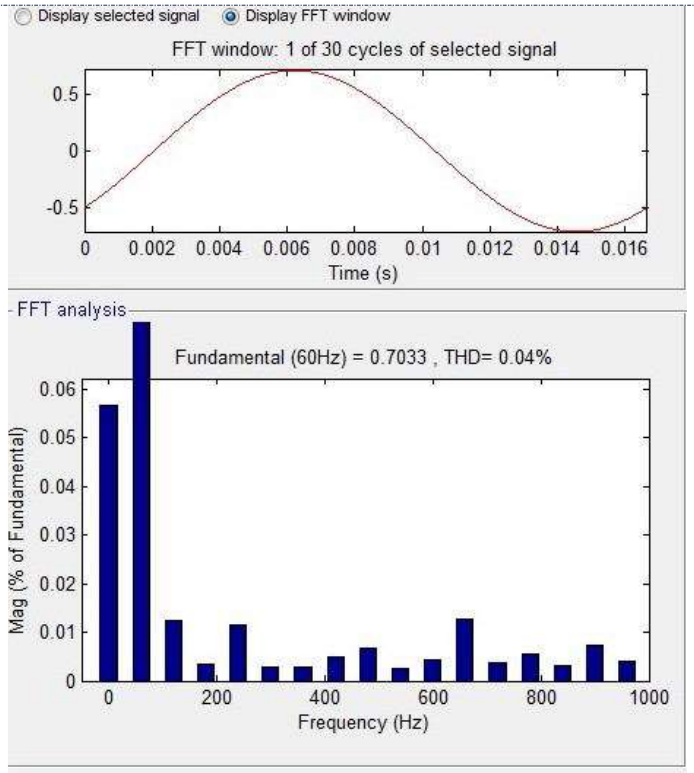


***Figure 8: (a) & (b) 30 pulse converter & THD for input current***

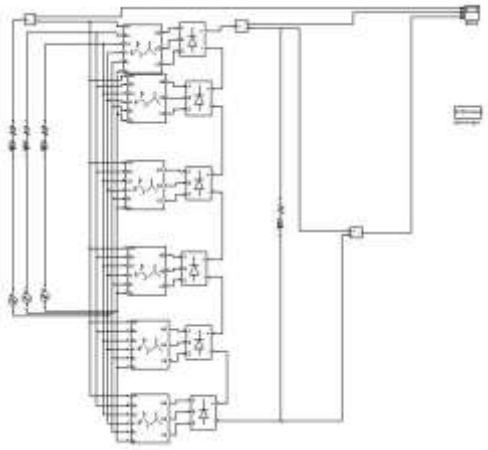

***Figure 9: 36 pulse converter***

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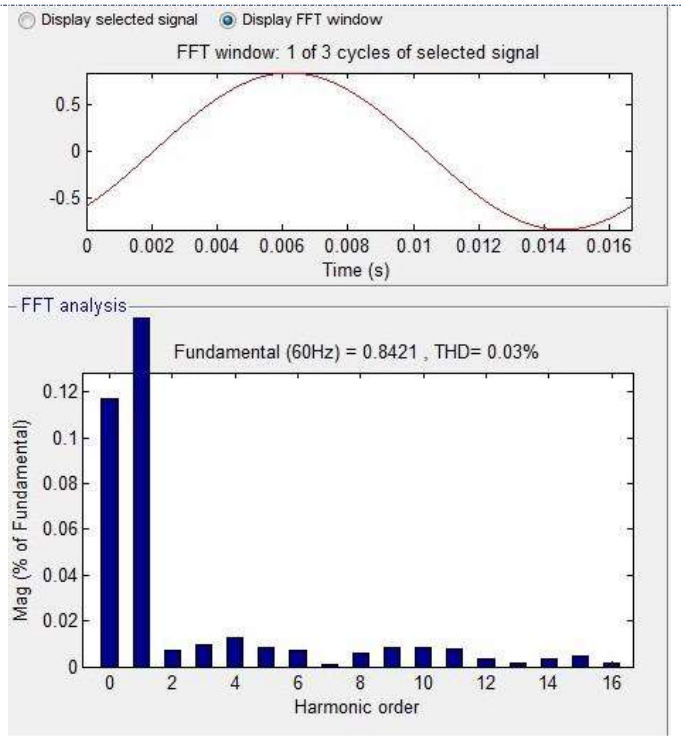


***Figure 10: (a) & (b) 36 pulse converter & THD for input current***

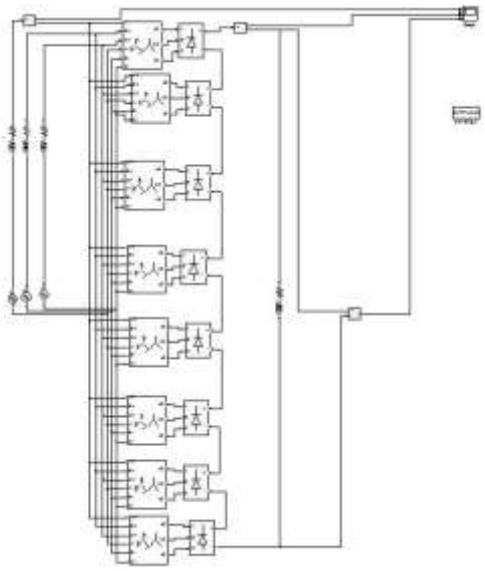

***Figure 11:48 pulse converter***

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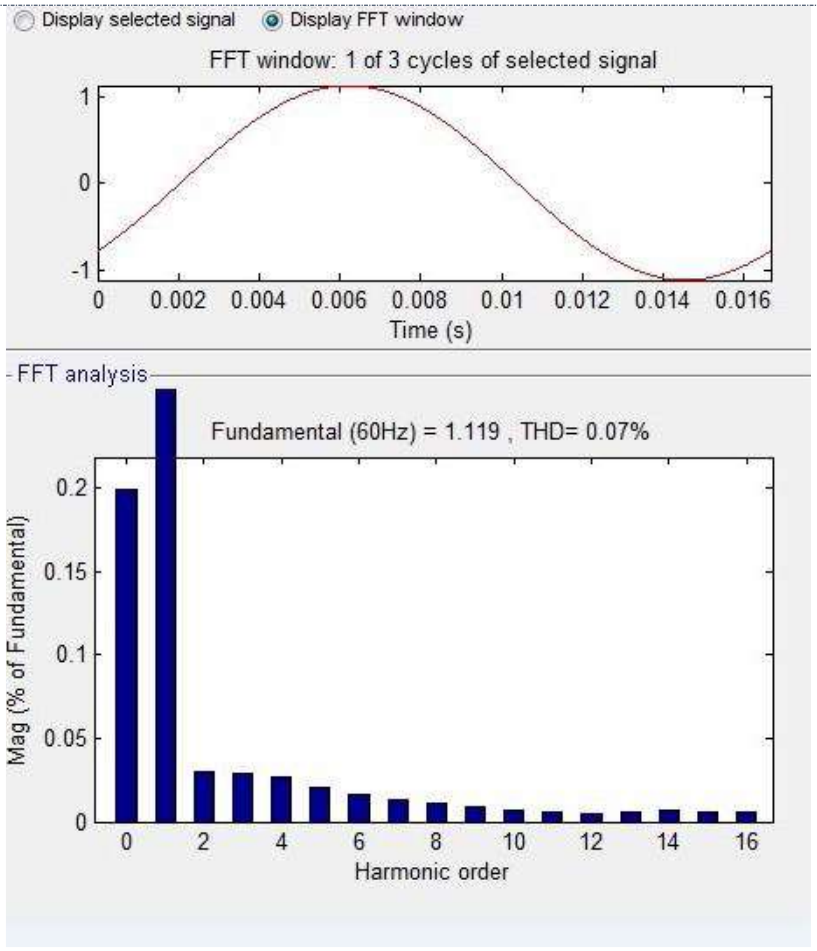


*Figure 12: (a) & (b) 48 pulse converter & THD for input current*

**Modeling and Simulation of Multi-Pulse Method using Thyristor**

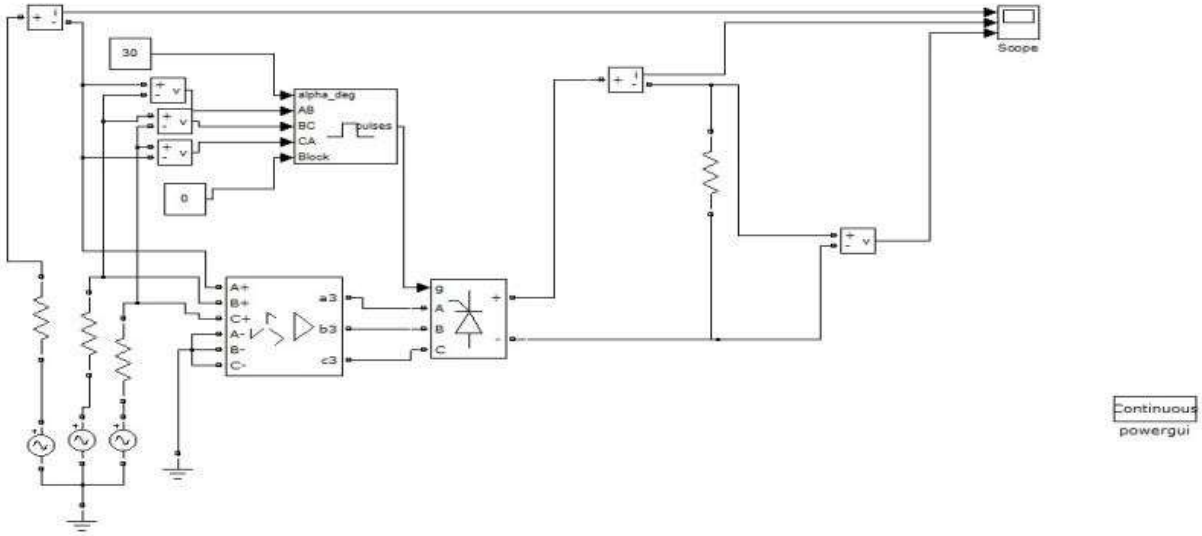


*Figure 12: 6 pulse converter thyristor reactifier*

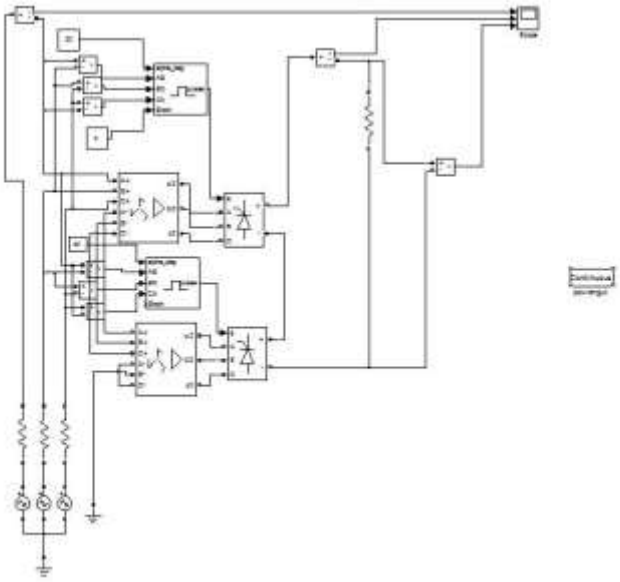

***Figure 13: 12 pulse thyristor converter***

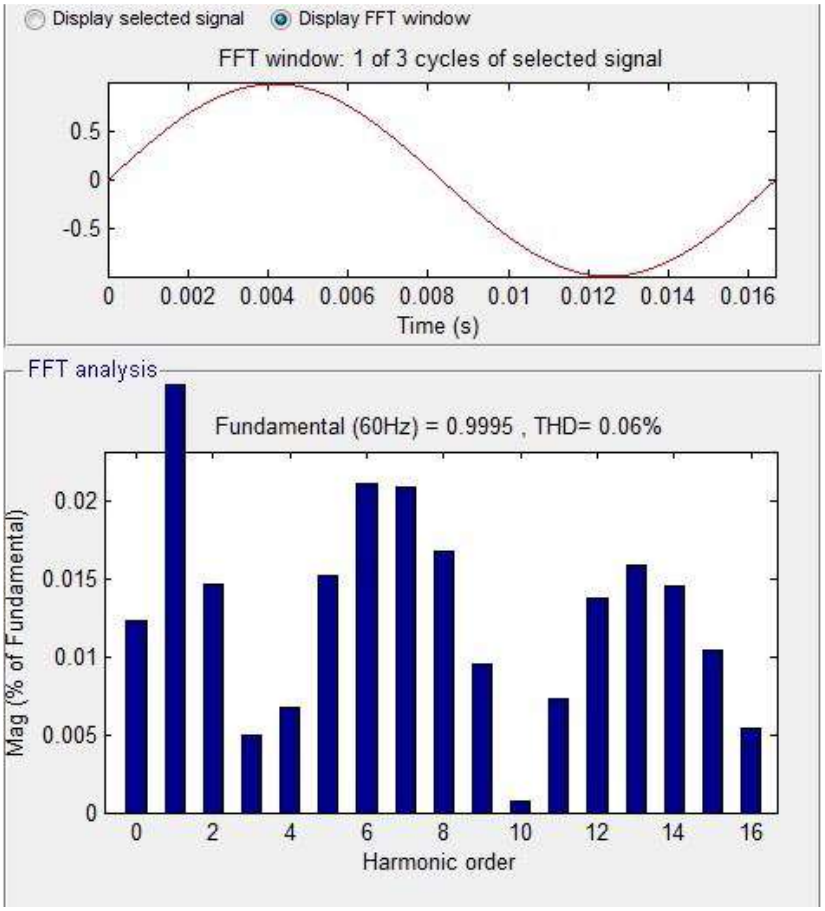


***Figure 14: 12 pulse converter & THD for input current.***

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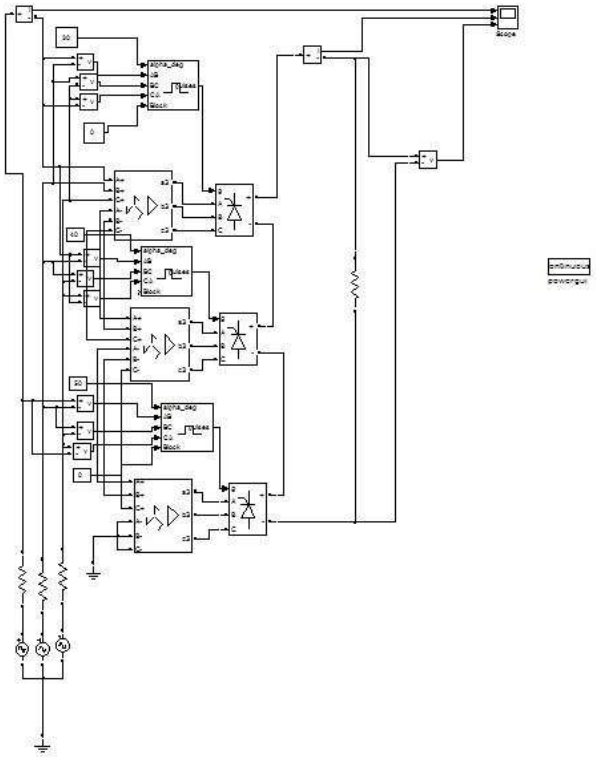

***Figure 15: 18 pulse converter***

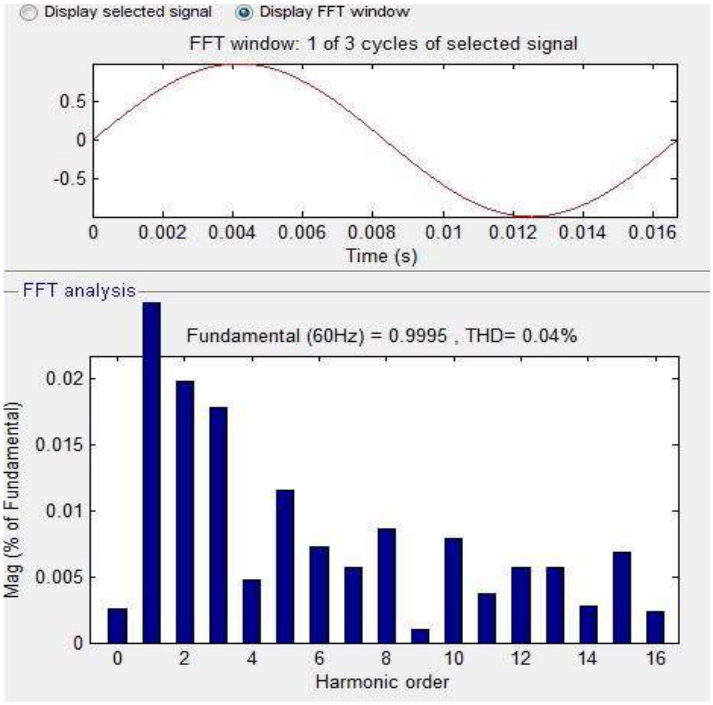


***Figure 16: 18 pulse converter & THD for input current***

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| Multi-pulse converter (Diode) | Total Harmonic Distortion (THD) | Power Factor |
|---|---|---|
| 12 pulse converter | 0.12 | 0.990 |
| 18 pulse converter | 0.8 | 0.996 |
| 24 pulse converter | 0.10 | 0.990 |
| 30 pulse converter | 0.04 | 0.999 |
| 36 pulse converter | 0.03 | 0.999 |
| 48 pulse converter | 0.07 | 0.995 |

| Multi-pulse converter (Thyristor) | Total Harmonic Distortion (THD) | Power Factor |
|---|---|---|
| 12 pulse converter | 0.06 | 0.93 |
| 18 pulse converter | 0.04 | 0.96 |

## CONCLUSION

Multi-pulse reactifier provides effective solution for harmonic reduction. This provides the 12-pulse, 18-pulse and various topologies provides the effective solution for Total Harmonic Distortion(THD) for input current and power factor which is concluded in table no. 1 (A) ,(B). These constellation provides the cost effective solvent for high power constellation in power industry.

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