



## ANALYSIS OF THREE PHASE FLYBACK CONVERTER.

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**Abstract:** A Flyback converter is a converter with isolation between the input and the output side. Isolation is provided by flyback transformer. In this paper simulation of a 3 phase AC-DC Flyback converter is carried out with the use of input filter and THD analysis is carried out. The use of input filters decreases the THD within the permissible limits. A three phase converter is relatively easier to install and relatively must cheaper as well. The use of Flyback converter has increased for low power applications in SMPS. Flyback converter can be used to increase or decrease the output voltage depending upon the requirement by adjusting the duty cycle or the turns ratio of the transformer. So in this paper simulation is done and results are studied and analyzed.

**Keywords:** Flyback converter, LC filter, THD, SMPS.

### I. INTRODUCTION.

Converters can be categorized as isolated and non-isolated. Non-isolated converters are categorized as buck, boost, buck-boost etc. The isolated converters are categorized as forward, flyback converter etc. The Flyback converter in the past few years has gained more importance in SMPS circuits due to its simpler design. The input output voltage relation is given by:

$$\frac{V_o}{V_d} = \frac{N_2 D}{N_1 (1-D)}$$

It is evident from the above equation that the output voltage can be stepped up or down using either the duty cycle or the turns ratio of the flyback converter. Increasing the output voltage only by the use of duty cycle e.g. as in case of buck-boost converter increased the stress over switches but using Flyback converter the stress over the switches can be reduced by increasing the output voltage using turns ratio as well. Three phase AC-DC Flyback converter converts three phase AC supply to constant DC supply by the help of a three phase rectifier. [1-4]

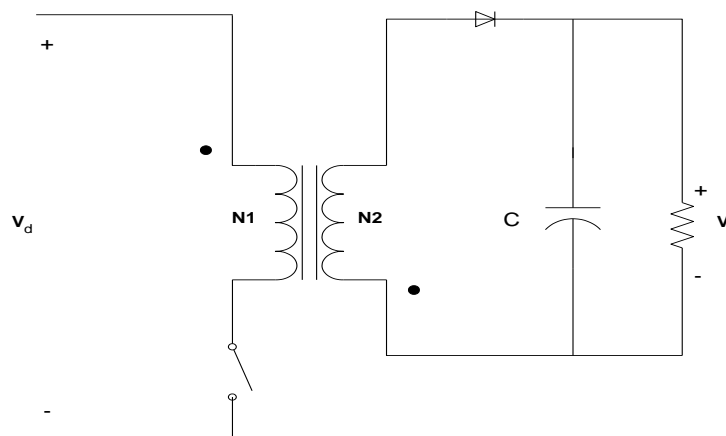


Fig 1. Circuit Topology of the Flyback Converter

## II. SYSTEM SPECIFICATIONS.

TABLE I. Parameters of implementation circuit without the use of filter

Parameter Description	Abbreviation	Value
Input Voltage (three phase)	$V_{ac}$	100 V
Output Voltage	$V_o$	200 V
Power	P	100 W
Switching Frequency	$f_s$	50 KHz
Output Capacitor	$C_o$	1 $\mu$ F
Magnetizing Inductance	$L_m$	5 mH

TABLE II. Parameters of implementation circuit with the use of filter.

Parameter Description	Abbreviation	Value
Input Voltage (three phase)	$V_{ac}$	100 V
Output Voltage	$V_o$	200 V
Power	P	100 W
Switching Frequency	$f_s$	50 KHz
Filter Capacitor	$C_1$	10 $\mu$ F
Filter Inductor	$L_1$	5mH
Output Capacitor	$C_o$	1 $\mu$ F
Magnetizing Inductance	$L_m$	1 $\mu$ H

## III. SIMULATION.

### A. Simulink model of three phase Flyback converter without filter.

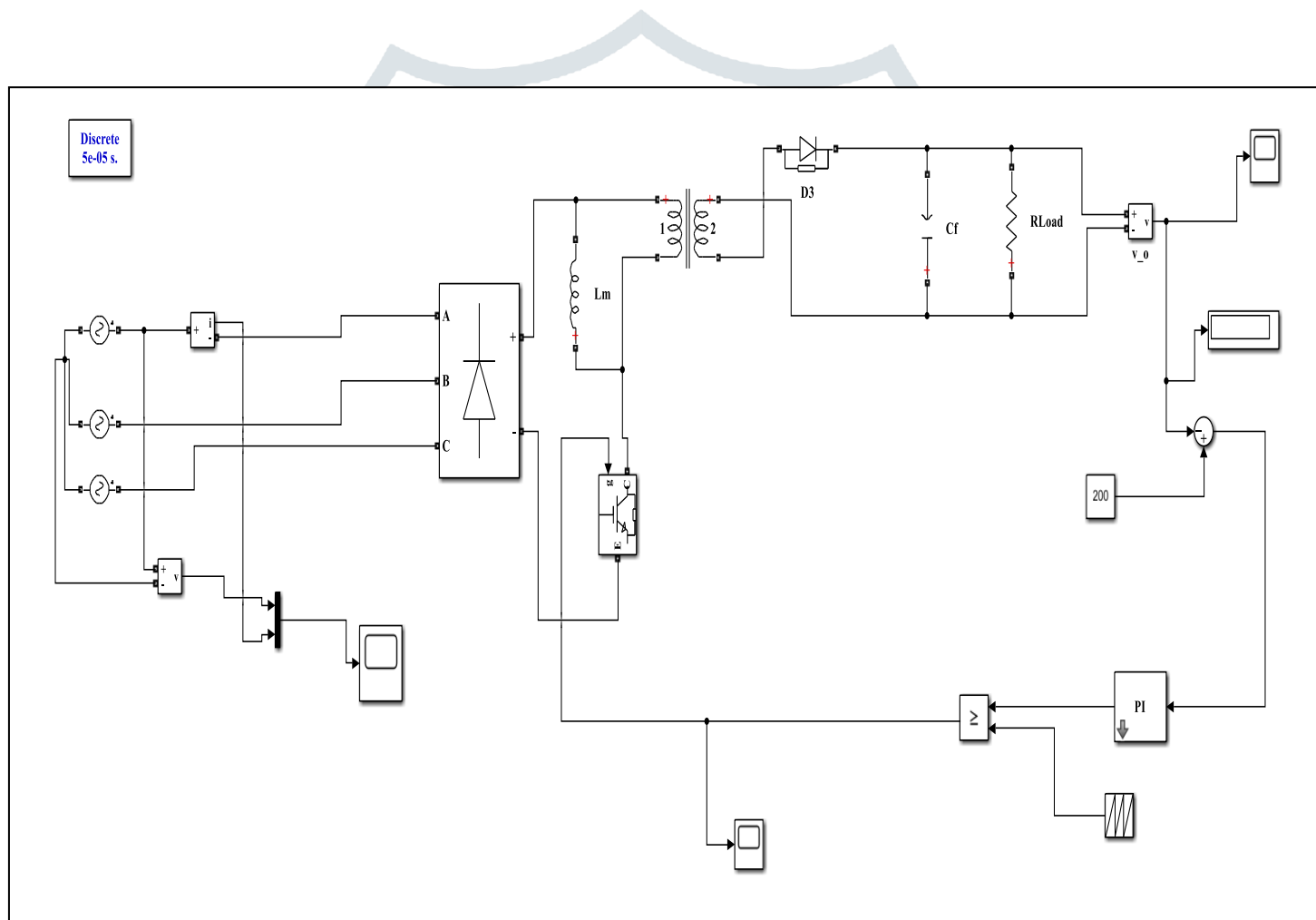


Fig2. Model of Flyback Converter without filter.

B. Simulink model of three phase Flyback converter with filter.

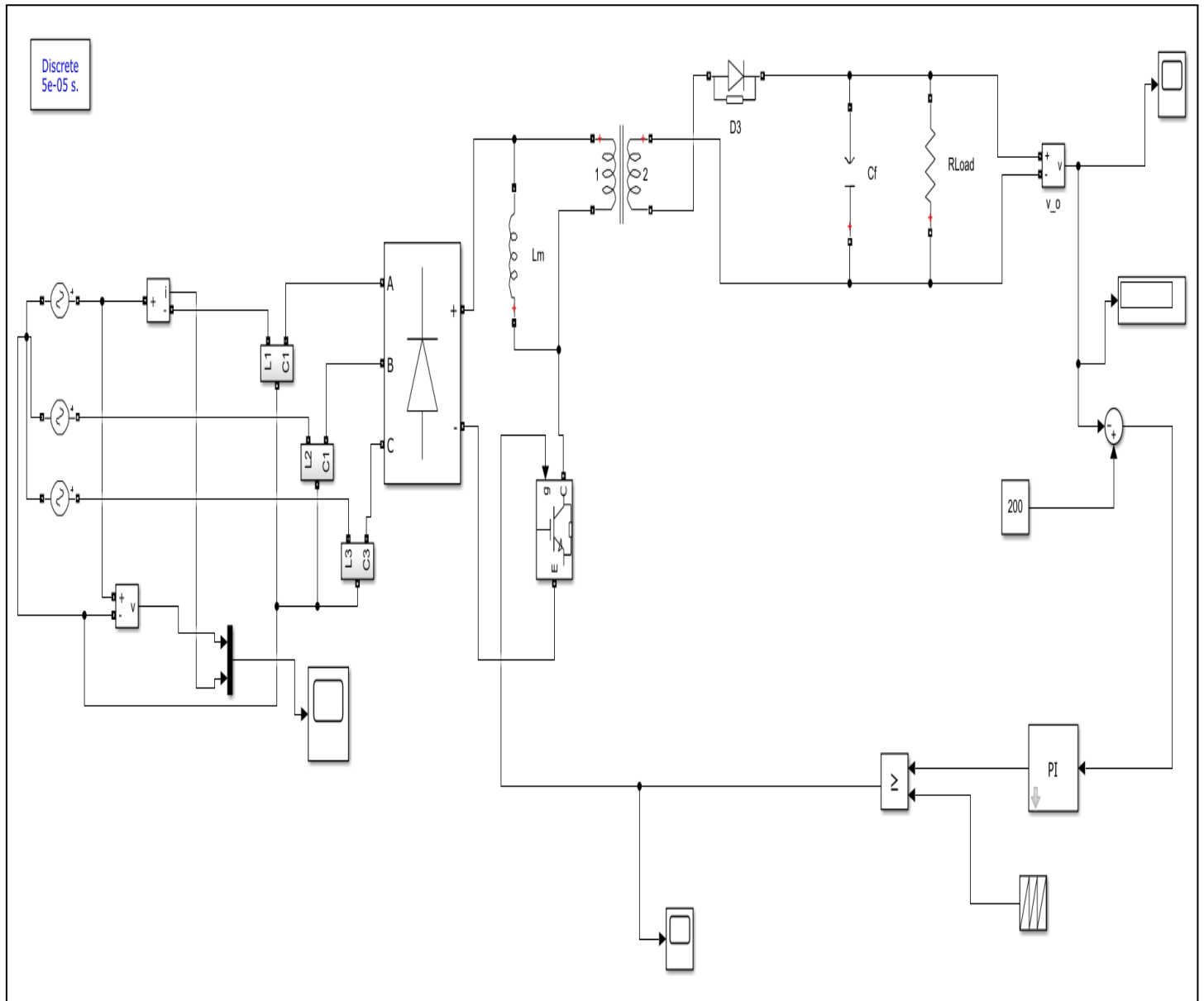


Fig 3 Model of Flyback Converter with filter

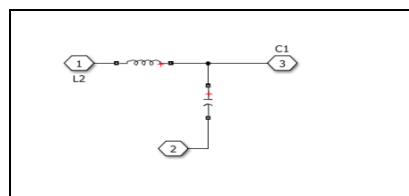


Fig 3(a) LC Filter.

### IV. RESULTS

A. Simulink Results of three phase Flyback converter without filter.

B. Simulink Results of three phase Flyback converter with filter.

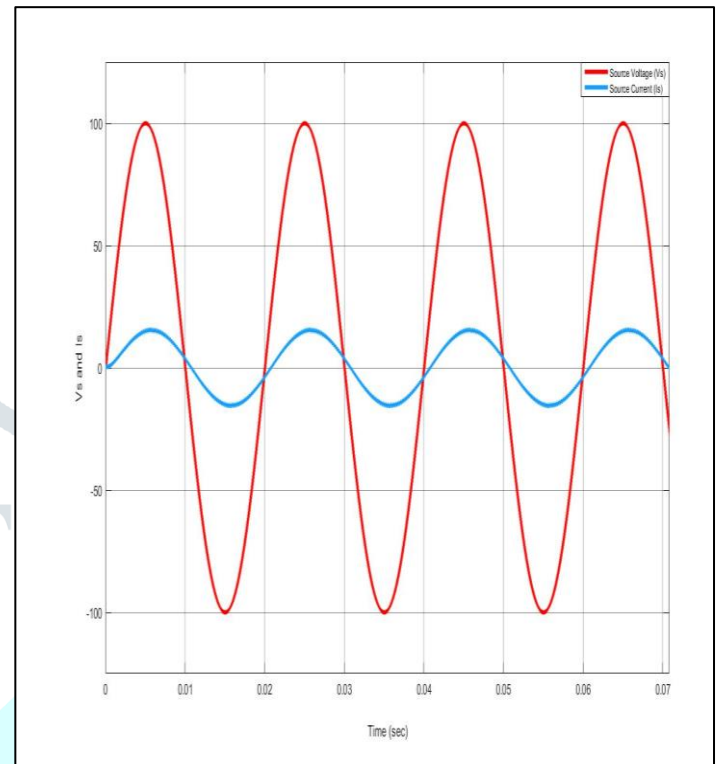
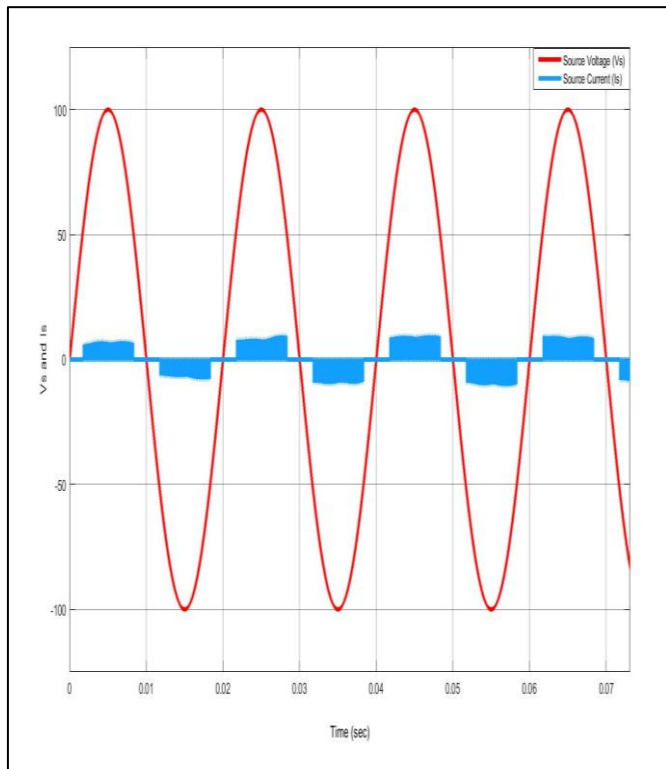


Fig 4 Source Voltage and Source Current of three phase Flyback converter without filter

Fig 6 Source Voltage and Source Current of three phase Flyback converter with filter.

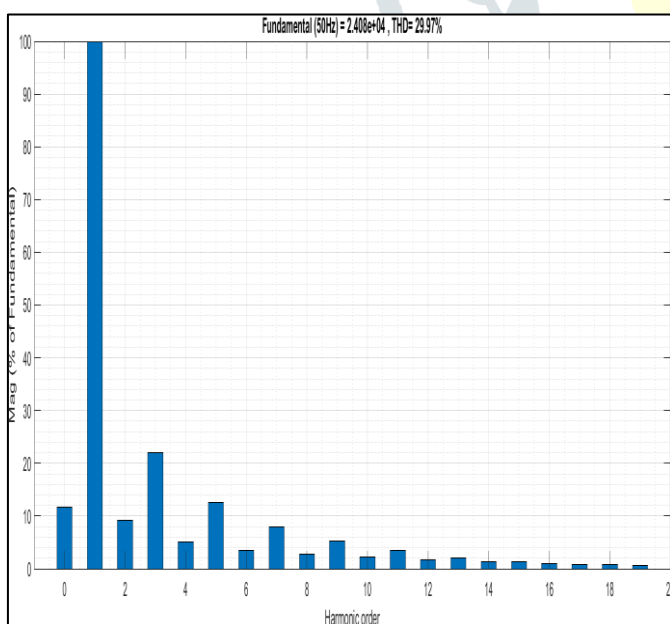


Fig 5 THD analysis of three phase Flyback converter without filter.

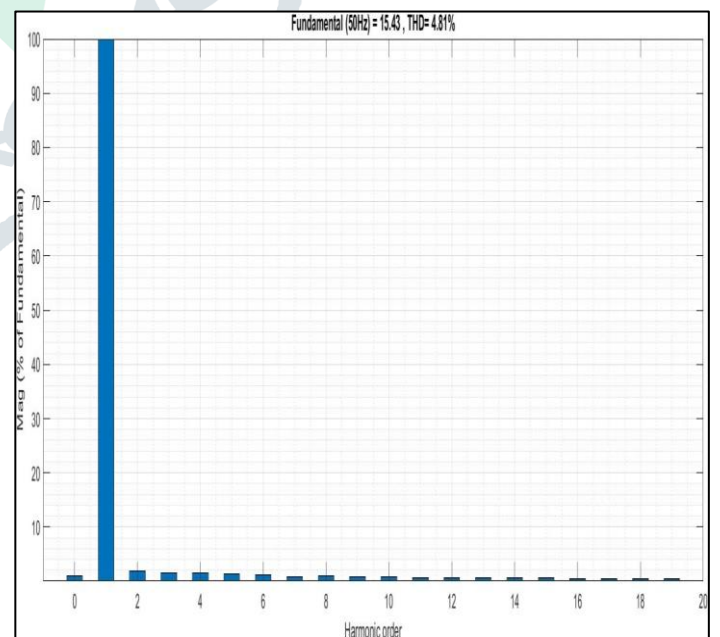


Fig 7 THD analysis of three phase Flyback converter with filter.

## V. CONCLUSION.

From the MATLAB simulink model of close loop three phase Flyback converter using PI controller, the oscillations are removed from the system response and the THD was found to be 29.97% in case of Flyback converter without filter, while in case of Flyback converter with the use of filter THD was found to be 4.81% that is within permissible limits.

## VI. ACKNOWLEDGMENT.

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