GLOBAL RESEARCH ANALYSIS

GLOBAL RESEARCH ANALYSIS

ISSN No 2277 - 8160

listed & Indexed with
International ISSN Directory, Paris



Multi-Subject Journal

Volume : 1 | Issue : 3 | August 2012 | ₹ 250/-

ISSN No 2277 - 8160

GLOBAL RESEARCH ANALYSIS

Editor In-Chief :

Dr. Khansa Memon
SARA Publishing Academy

Dr. Ashok S. Pawar Associate Professor, Dept. of Economic Dr. Babaasaheb Ambedkar Marathwada.University, Aurngabad.(MS-India)-431004	**Dr.(Prof) Vijay Kumar Soni** Principal, Jai Meenesh College, Phagi, Jaipur, Rajasthan	**Dr. A.R. Saravankumar** Assistant Professor in Education DDE, Alagappa University, Tamilnadu
Dr. R. Ramachandran Commerce DDE Annamalai University Tamilna	**Dr. R Ganpathy** Assistant Professor in Commerce Directorate of Distance Education Alagappa University Karaikudi.	**Dr. Amit Bandyopadhyay** Assistant Professor Department of Physiology University of Calcutta
Dr. V. Kumaravel Professor and Head Vivekanandha Business School for Women Tiruchengode, Namakkal Dist	**Dr. K. Prabhakar** Professor, Department of Management Studies, Velammal Engineering College, Chennai - 600 066.	**Dr. Sunita J. Rathod** Maharashtra Education Service Group-B DIET Dist. Jalna

SUBSCRIPTION DETAILS

Period	Rate	Discount	Amount Payable
One Year (12 issues)	3000/-	Nil	3000/-
Two Years (24 issues)	6000/-	200/-	5800/-
Three Years (36 issues)	9000/-	300/-	8700/-
Five Years (60 issues)	15000/-	600/-	14400/-

You can download the Subscription form from website www.theglobaljournals.com. You will require to print the form. Please fill the form completely and send it to the Editor, GLOBAL RESEARCH ANALYSIS along with the payment in the form of Demand Draft/Cheque at Par drawn in favour of GLOBAL RESEARCH ANALYSIS payable at Ahmedabad.

- Thoughts, language, vision and examples in published research paper are entirely of author of research paper. It is not necessary that both the editor, and editorial board agrees with the author. The responsibility of the matter of research paper/article is entirely of author.
- Editing of the Global Research Analysis is processed without any remittance. The selection and publication is done after recommendations of atleast two subject expert referees.
- In any condition if any National/International University denies accepting the research paper published in GRA, then it is not the responsibility of Editor, Publisher and Management
- Only the first author is entitle to receive the copies of all co-authors
- Before re-use of published paper in any manner, it is compulsory to take written permission from the Editor-GRA unless it will be assumed as disobedience of copyright rules
- All the legal undertaking related to Global Research Analysis is subject to Ahmedabad Jurisdiction.
- The research journal will be send by normal post. If the journal is not received by the author of research paper then it will not be the responsibility of the Editor and publisher. The amount for registered post should be borne by author of the research paper in case of second copy of the journal.

Editor,
GLOBAL RESEARCH ANALYSIS
8-A, BANAS, Opp. SLU Girls College, Nr.Congress Bhavan, Paldi, Ahmedabad - 380006. Gujarat (INDIA)
Cell: +91 9824702127, 8866003636

INDEX

Sr. No.	Title	Author	Subject	Page No.
1	Antipyretic Activity Of Tagetes Patula	K.Shakila, D.Sukumar, G.Madhubala	Chemistry	1-2
2	Benefits Derived From Warehouse Management System By Small Manufacturing Firms	Dr. Vipul Chalotra, Prof Neetu Andotra	Commerce	3-4
3	Women Welfare Through Prime Minister Rozghar Yojana At Coimbatore District	Swapna Kurian	Commerce	5-7
4	Sources Of College Funds In Assam-An Overview	Dr. Niranjan Kakati	Commerce	8-9
5	Mgnarega- For Socio-Economic Transformation Of Rural Society In J&K	TARSEM LAL	Commerce	10-11
6	Performance Appraisal And Career Growth	Dr. J.K. Sehgal	Commerce	12-13
7	Corporate Governance Practices - Emerging Trends	Dr. V.Rajendran	Commerce	14-16
8	A Text Mining Framework: Promises And Challenges	Prof.Sangeeta Mahesh Borde, Prof.Bareen Kayyum Shaikh	Computer Science	17-19
9	Effects Of Infant Mortalty Rates On Fertility	Mrs. Nazia Ansari, Mrs. Aqsa Khatri	Economics	20-21
10	Social Entrepreneurship Initiatives In India	Dr. Shradha H. Budhedeo, Parinda Doshi	Economics	22-25
11	Economics Of Corruption	Prof. Dr. K.J. Thankachan	Economics	26-27
12	A Study On Attitude Of High School Students Towards Physics Lessons And Physical Experiments	Dr. Kotreshwaraswamy A. Surapuramath	Education	28-30
13	Utilization Of Science Laboratories At High Schools	Dr. Praveena K. B.	Education	31-33
14	Mutidimensional Techniques For Mathematical Operations	M.Kavitha , Dr.AR. Saravanakumar	Education	34-36
15	Scientific Approach of Communication Theory	Dr. Mujibul Hasan Siddiqui	Education	37-38
16	Design And Implementation Of Ethernet Controller On Fpga	Jesika Benani	Engineering	39-41
17	Development of Control Algorithm to Reduce Harmonic in Boost Converter	Mitulkumar R. Dave, Prof. K.C. Dave	Engineering	42-43
18	Development Of Control Algorithm To Reduce Harmonics In Buck Converter	Vipul C. Rajyaguru, Keerti S.Vashishtha, K. C. Dave	Engineering	44-46
19	Gandhian Principles And Women Empowerment Through Self-Help Groups	Dr. Chetankumar N. Trivedi	English	47-48
20	Kathal- its medicinal uses	Dr. Sneh Harshendra Sharma	Environment	49-50
21	Extemporize Employee Engagement: Challenges.	Dr.Pooja Arora	Management	51-53
22	Conceptual Study To Understand The E-Governance Prestige Values Associated With Nagar Nigam	Dr.Murlidhar Panga , Mr.Arpit Neema	Management	54-56
23	Impact Of Globalization On Environment	Ankita Soni	Management	57-58
24	A Study On Strategic Cost Management Of Tanishq	Mr. Suresh A.S, Mr. Bharath R	Management	59-61

Sr. No.	Title	Author	Subject	Page No.
25	Impact Of Soap Operas Among The Housewives And Working Woman Of Silchar Town	Dr Partha Sarkar	Mass Communication	62-64
26	A Tool For Sex Identification	Dr. Renuka B. Adgaonkar, Dr. M. P. Ambali	Medical Science	65-67
27	Ideal characters in Sanskrit literature	Dr. Labhuben Maldebhai Karavdara	Sanskrit	68
28	Progresive life in vaidik life	Dr. Labhuben Maldebhai Karavdara	Sanskrit	69
29	Familisation or family in Vaidik Literature	Dr. Labhuben Maldebhai Karavdara	Sanskrit	70
30	Morden Moral Of Modern Environment In Nature's Description Of Vishnupuran	Dr. Labhuben Maldebhai Karavdara	Sanskrit	71-72
31	India's Small Holder Dairying In Liberalized Era	Dr Ashish.K.Makwana	Science	73-74
32	Common Man And The Uncommon Law : An Overview	Dr. Shereen Sadiq	Social Science	75-77
33	Perspectives Of Counselling	Dr, R.DhakshinaMurthy	Social Sciences	78-80
34	Sri Sri And His Literary Works: Some Social Reflections	Dr. M. Sreedevi Xavier	Social Sciences	81-83

Volume : 1 | Issue : 3 | Aug 2012 • ISSN No 2277 - 8160

Research Paper | Engineering

Development of Control Algorithm to Reduce Harmonic in Boost Converter

Mitulkumar R. Dave — M.E.- II Year (Applied Instrumentation),L.D.College of Engineering Ahmedabad

Prof. K.C. Dave — Instrumentation & Control Engineering,L.D.College of Engineering Ahmedabad

ABSTRACT

This paper explains the reduction of harmonics in boost converter for particular design specification. Boost converter is designed according to the desired specification. Then it is implemented without controller and with PID controller. The Total Harmonic Distortion (THD) is measured for both methods for very low load. Also THD measured with different PID algorithm considering different P,I and D parameter. Finally, conclusion has been made from that result.

KEYWORDS:Boost Converter without Controller; Converter with PID Controller; Total Harmonic Distortion (THD); Peak-Overshoot

I.Introduction

The power electronics equipment, such as rectifier, inverter and chopper has switching devices and their operation produces current and voltage harmonics into the system from which are working. These harmonics affects the operation of the other equipments connected to the same system through conduction or by radio interference. The harmonics present into the system lead to the following disadvantages:

- Harmonic current will lead to excessive heating in the induction motors connected with the thyristors system. This will reduce the load carrying capacity of the motor.
- If the control and regulating circuits are not properly shielded, harmonics from power side can affect their operation and malfunctioning can result.
- On critical load, torque pulsation produced by harmonic current can be harmful.
- Harmonic current cause losses in the ac system and can even sometime produce resonance in the system.

These effects can be minimized by reducing the harmonic content. Harmonic can be measure by Total Harmonics Distortion (THD) which is defining as the ratio of the total harmonic content to the fundamental component [1].

There are many different techniques are available for reducing harmonics in converter. For single phase ac-dc converter, current control techniques with variable switching frequency and constant switching frequency can be used. But the variation in switching frequency cause high frequency ripple voltage and increase switching losses also total harmonic distortion (THD) is very low for constant switching frequency technique compare to that of the variable switching frequency technique [2].

Current injection technique also reduces harmonics into converter. The principle of current injection method is to modify the input current waveform by injecting every harmonic component of the rectified current, with an opposite phase, to the ac side of the converter. The current injection circuit is used for harmonic reduction of the controlled and uncontrolled single-phase bridge rectifier. Analytical study of current injection technique shows a drastic minimization of 3rd , 5th, 7th , 9th,…. harmonic components of the input current, with total harmonic distortion (THD) of the input current reduced from 48% to ~10% and power factor improved nearly to unity [3].

Boost converter with current mode control is used with peak current mode control and Hysteresis current mode control. But from both methods the peak current mode control technique is less sensitive for noise than the hysteresis current mode control [4]. In this paper I explained the design of the boost converter for particular specification. I used boost converter without controller and with PID controller. The %THD result is measured and compared for both methods. Also different PID control algorithm is used and %THD is measured for different, and .

II.DESIGN SPECIFICATIONS

Design Specification of the Boost Converter is:

- Input Voltage(ac) = 12 Volts
- Output Voltage(dc) = 32 Volts
- Supply Frequency = 50 Hz
- Switching Frequency = 600 Hz
- DC Link Capacitor = 100 µF
- Boost Inductor = 168 mH
- Input Filter Capacitor = 10 µF

III. HARDWARE IMPLEMENTATION

The Fig. 1 shows the boost converter without controller. In this the transformer converts 230 volt ac into 12 volt ac. Then it is passed to the ac-dc converter which converts 12 volt ac into 17 volt (peak) dc. After that boost converter step up the voltage up to 32 volt as shown in Fig 2. Here, 600 Hz

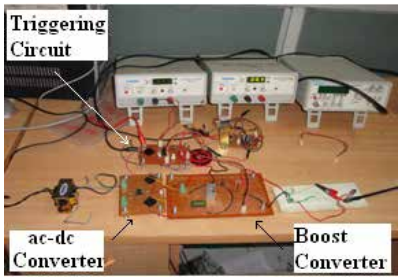

Figure 1 Boost Converter without Controller

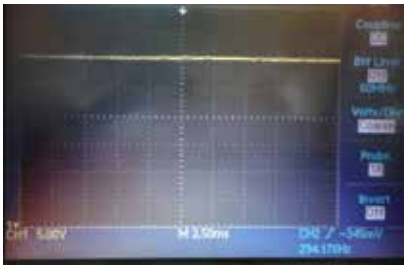

Figure 2 Output Voltage of Boost Converter without Controller (31.5 volt)

with 55% duty cycle is applied to the switching device. At first only one ac source is used. But to reduce harmonics the 90 degree phase shifted ac source is connected parallel to the first ac source which helps to reduce harmonic.

The boost converter with controller and its output waveform are shown in Fig. 3 and 4 respectively. The implementation same as explain ear-

lier but here, the output voltage is reduced by voltage divider and that voltage is fed to the controller in which the output is generated according to the algorithm and error (required voltage – actual

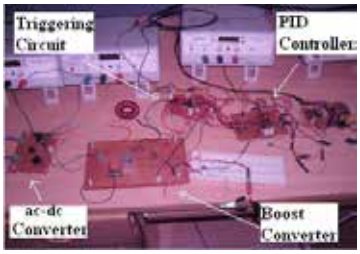

Figure 3 Boost Converter with PID Controller



Figure 4 Output Voltage of Boost Converter with PID Controller (31 volt) voltage). This output is given to the triggering circuit that produces PWM pulses according to the output of the controller. Finally, this PWM pulses is given to the switching device of the boost converter.

IV. Experimental Result

The output voltage is produced same for boost controller without controller and with controller as shown in Fig. 2 and 4. If there is change in load, the output voltage varies in boost converter without controller. But the boost converter with controller maintain the output voltage same for any variation in load. The FFT analysis has been measured for boost converter without controller, converter without controller using phase shifter and converter with controller using 90 degree phase shifter that is shown in Fig. 5, Fig. 6 and Fig. 7 respectively. From that it can be say that

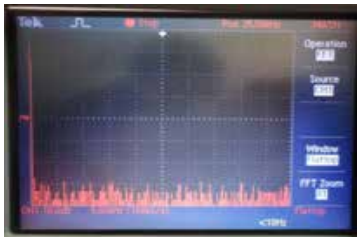

Figure 5 FFT analysis for Boost Converter without Controller

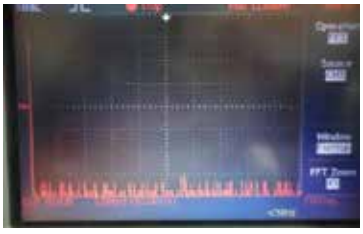

Figure 6 FFT analysis for Boost Converter without Controller using 90 degree Phase Shifter



Figure 7 FFT analysis for Boost Converter with PID Controller using 90 degree Phase Shifter

the converter without controller produces 9.5% THD. If the 90 degree phase shifter is added to the converter, it produces 7.39% THD. Then finally the converter is used with PID controller. The result of %THD for different PID algorithm for different, and parameter is shown in table 1. Also percentage peak overshoot produced in different parameter is shown in table 1.

TABLE 1 THD and Peak Overshoot for different Control Algorithm using DIFFERENT, and Parameter.

			THD %	PeakOver-shoot %
P+I+D				
0.76	16.16	3.48	5.23	11.36
P-I-D				
0.76	16.16	3.48	4.67	9.37
1.55	27.7	2.39	8.29	-
1.55	27.7	7.53	4.94	-
1.55	0.10	7.53	4.32	-
7.87	0.10	7.53	3.96	-
I-P-D				
3.57	0.114	7.50	4.03	33.02
3.57	0.04	7.54	8.78	17.64
3.57	0,343	7.54	4.66	22.00
8.23	0.343	7.50	6.58	32.33
6.61	0.343	0.92	5.48	29.41

V. CONCLUSION

From experimental result it can be say that the boost converter without controller produces 9.5 % THD which is reduced to 7.39 % by adding 90 degree phase shifter to the converter. Finally, PID controller is added that reduced harmonics depending on the control algorithm and P (Proportional), I (Integral) and D (derivative) parameters. In above result P-I-D algorithm provides less %THD and also reduced or no peak overshoots which prevents damage to the system due to excessive peak of voltage. Also I-P-D algorithm gives better result for % THD but it produces more peak overshoot. So finally it is concluded that the boost converter with PID controller using P-I-D algorithm provides less %THD for a particular considered design.

REFERENCES

] K.B.Khanchandani & M.D.Singh. Power Electronics. New Delhi: Tata Mcgrawhill, 2005. | [2] Mr. D. Lenine and Dr.Ch. Sai Babu," Comparison Between Variable Switching Frequency And Timer Controller With Constant Switching Frequency Techniques For PFC Converter", IJCEE, Vol. 1, No. 2, pp. 183-187, June 2009. | [3] Hussein I. Zainal, Salar A. Kadir and Hilmi F. Ameen," New Design Circuit Harmonic Reduction of Single Phase Converter by Current Injecting Method", Electrical Engineering Department, Engineering College, Salahaddin University, Erbil, Iraq. | [4] A. Karaarslan and I. Iskender," The Analysis of AC-DC Boost PFC Converter Based On Peak and Hysteresis Current Control Techniques", IJPTE, Vol. 3, No. 2, Issue 2, pp. 100-105, June 2011. | [5]"Harmonic and IEEE 519", www.energylogix.ca/harmonics_and_ieee.pdf | [6] Ramakant A. Gayakwad, Op-Amps and Linear Integrated Circuit, 4th Edn, PHI learning Private Ltd., New Delhi, 2009. | [7] Joseph Vithayathil, Power Electronics: Principles & Applications, MacGraw-Hill Inc., New Delhi, 1995. | [8] Associated Power Technologies," Total Harmonic Distortion and Effects in Electrical Power System", www.aspowertechnologies.com | [9] Oscar García, José A. Cobos, Roberto Prieto, Pedro Alou and Javier Uceda," Single Phase Power Factor Correction: A Survey", IEEE Transactions on Power Electronics, Vol. 18, No. 3, pp. 749-755, May 2003 |



Sara Publishing Academy

GLOBAL RESEARCH ANALYSIS

Multi-Subject Journal

Editor,

GLOBAL RESEARCH ANALYSIS

8-A, BANAS, Opp. SLU Girls College, Nr.Congress Bhavan, Paldi, Ahmedabad - 380006. Gujarat (INDIA)

Cell: +91 9824702127, 8866003636

Printed at Unique Offset, Novatsing Rupam Estate, Opp. Abhay Estate, Tavdipura, Shahibaug, Ahmedabad

Designed By : AdVoice Inc. +91 9824484447