Mangalam Campus
Mangalam Hills, Vettimukal P.O
Ettumanoor, Kottayam
Kerala-686631

MANGALAM
COLLEGE OF ENGINEERING
Inspire | Imbibe | Innovate

Ph :+91-481-2710120, +91-481-2537053
+91-481-2533711, Fax: +91-481-2533700
Web : www.mangalam.ac.in
E-mail : info@mangalam.in

( Approved by AICTE, Affiliated to MGU / APJ Abdul Kalam Technological University, NAAC Accredited & ISO Certified Institution )

AY: 2017-18

3.3.1.1. Total number of books and chapters in edited volumes/books published and papers in national/ international conference proceedings year-wise during last five years

| SL NO | NAME OF TEACHER | TITLE OF PAPER | TITLE OF BOOK PUBLISHED | TITLE OF THE PROCEEDING O THE CONFERENCE/WORKSHOP/SYMPOSIA | NAME OF THE PUBLISHER | YEAR OF PUBLICATION (ACADEMIC YEAR) | NATIONAL/INTERNATIONAL | ISBN NUMBER |
|---|---|---|---|---|---|---|---|---|
| 1 | SUSAN V NINAN | High Efficient Z-Source DC Dc Boost Converter | | International Multi Conference on Computing,Communication, Electrical and Nanotechnology –I2CN 2k18 proceedings | International Multi Conference on Computing,Communication,Electrical and Nanotechnology –I2CN 2k18 | 2017-18 | International | |
| 2 | RAHUMATH BEEBY | Single Stage Solar PV fed Induction Motor Driven Water Pump | | International Multi Conference on Computing,Communication, Electrical and Nanotechnology –I2CN 2k18 proceedings | International Multi Conference on Computing,Communication,Electrical and Nanotechnology –I2CN 2k18 | 2017-18 | International | |
| 3 | JENEESH SCARIA | High Efficient Z-Source DC Dc Boost Converter | | International Multi Conference on Computing,Communication, Electrical and Nanotechnology –I2CN 2k18 proceedings | International Multi Conference on Computing,Communication,Electrical and Nanotechnology –I2CN 2k18 | 2017-18 | International | |
| 4 | JEEPA K J | High Voltage Gain Transformer less Buck Boost DC –DC Converter | | International Multi Conference on Computing,Communication, Electrical and Nanotechnology –I2CN 2k18 proceedings | International Multi Conference on Computing,Communication,Electrical and Nanotechnology –I2CN 2k19 | 2017-18 | International | |

PRINCIPAL
MANGALAM COLLEGE OF ENGINEERING
Ettumanoor

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | EUGENE PETER | A Novel Fly Back Converter | | International Multi Conference on Computing,Communication, Electrical and Nanotechnology –I2CN 2k18 proceedings | International Multi Conference on Computing,Communication,Electrical and Nanotechnology –I2CN 2k20 | 2017-18 | International |
| 6 | PHEJIL K PAUL | A Novel Buck Boost Converter with an Enhanced Negative Output Voltage | | International Multi Conference on Computing,Communication, Electrical and Nanotechnology –I2CN 2k18 proceedings | International Multi Conference on Computing,Communication,Electrical and Nanotechnology –I2CN 2k20 | 2017-18 | International |
| 7 | SHOMA MANI | Single Stage Solar PV fed Induction Motor Driven Water Pump | | International Multi Conference on Computing,Communication, Electrical and Nanotechnology –I2CN 2k18 proceedings | International Multi Conference on Computing,Communication,Electrical and Nanotechnology –I2CN 2k18 | 2017-18 | International |
| 8 | NEEBA SABU | High Voltage Gain Transformer less Buck Boost DC –DC Converter | | International Multi Conference on Computing,Communication, Electrical and Nanotechnology –I2CN 2k18 proceedings | International Multi Conference on Computing,Communication,Electrical and Nanotechnology –I2CN 2k19 | 2017-18 | International |
| 9 | SREEDEVI P R | A Novel Fly Back Converter | | International Multi Conference on Computing,Communication, Electrical and Nanotechnology –I2CN 2k18 proceedings | International Multi Conference on Computing,Communication,Electrical and Nanotechnology –I2CN 2k20 | 2017-18 | International |
| 10 | Ms Fathima Shirin | Business Law | | | Thakur Publications | 2017 | National |

PRINCIPAL

MANGALAM COLLEGE OF ENGINEERING
Ettumanoor

Proceedings of the

# INTERNATIONAL MULTI CONFERENCE

## ON COMPUTING, COMMUNICATION, ELECTRICAL & NANOTECHNOLOGY

**26th & 27th APRIL, 2018**

Organized by

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

In Association with

Taylor & Francis
Taylor & Francis Group

photonics SOCIETY

IEEE

**EDITORS**

*Dr.T. D. Subhash, Professor*
*Prof. Neeba Sabu, AP ,EEE*
*Prof. Benny K. K. ,Professor,HOD*
*Prof.Eugene Peter, AP, EEE*

Published by

**MANGALAM COLLEGE OF ENGINEERING**

Kottayam, Kerala, India

(Accredited by NAAC & ISO 9001:2008 Certified Institution)

MANGALAM COLLEGE OF ENGINEERING
Ettumanoor

*Proceedings of the*

# INTERNATIONAL MULTI-CONFERENCE ON COMPUTING, COMMUNICATION, ELECTRICAL & NANOTECHNOLOGY (I2CN-2K18)

**26TH & 27TH APRIL, 2018**

विश्वं शास्त्रे प्रतिष्ठितम्

*Organized by*

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

*In Association with,*

Taylor & Francis
Taylor & Francis Group
photonics SOCIETY
IEEE
ELSEVIER

**EDITORS**

Dr.T. D. Subhash, Professor

Prof. Neeba Sabu, AP ,EEE

Prof. Benny K. K. ,Professor,HOD

Prof.Eugene Peter, AP, EEE

***Published by,***

**Mangalam College of Engineering**

Ettumanoor, Kottayam, Kerala, India

*(Accredited by NAAC & ISO 9001:2008 Certified Institution)*

PRINCIPAL
MANGALAM COLLEGE OF ENGINEERING
Ettumanoor

# A Novel Buck-Boost Converter with an Enhanced

Aravind Venugopal

Department of Electrical and Electronics

Mangalam College of Engineering

Kottayam, Kerala, India

Phejil K. Paul

Department of Electrical and Electronics

Mangalam College of Engineering

Kottayam, Kerala, India

*Abstract*— **This paper proposes the theoretical design of a l buck-boost converter with an enhanced negative output voltage than conventional converters. It is beneficial for applications that require a wide range of conversion ratio. The steady state, as well as power loss analyses of the proposed converter operating in continuous conduction mode, are examined. Comparison with typical negative output converters like the buck-boost converter, self-lift Luo converter and hybrid buck-boost converter are also presented to emphasize the proposal. The design is simulated and tested by using Matlab/Simulink software and found that the results consistently showed sensible conformity with the analysis.**

***Keywords-*** *Dc-dc power converters, conversion ratio, negative output, steady state*

## XVI. Introduction

During the past few decades, dc-dc converters have been beneficial for a wide range of industrial applications such as railway and transportation systems, factory automation systems, renewable power generation systems [1], information displays etc. As technological advancement is increasing rapidly over the years, dc-dc converters, especially negative output converters, play a vital role even in sophisticated applications like hybrid cars [2], small to medium-sized OLED displays, advanced data acquisition systems etc. These converters are so extensively used in industries since they provide a rugged solution to harsh environmental conditions. They are mostly compact and can be operated safely at temperatures ranging from -40°C to 85°C with efficiencies clocking up to around 90%.

Dc-dc converters, also known as dc choppers, are power electronic converters which converts fixed dc input voltage to a controllable dc output voltage. It actually regulates the output dc voltage against variations in line and load. Dc-dc converters can be advantages over soft switching converters. This includes high efficiency, constant frequency operation, high conversion ratios for both step-up and step-down applications and relatively robust control. However, in these converters, turn-on and turn-off losses occur in semiconductor switching devices due to PWM voltage and current waveforms. Thus, practical operating frequencies in such PWM converters are limited to a megahertz range.

Buck-boost and Cuk converters are the most commonly used negative output dc-dc converters. They both can provide a higher or lower output voltage than the input voltage and they have the same conversion ratios (-D/(1-D), where D is the duty cycle) as well. Therefore, theoretically, when the value of duty ratio is closer to 0 or 1, they should provide an extremely high step-up or step-down voltage. However, due to the limitations of power switches and diodes [4], it is not feasible in practice. Also, there are converters which uses transformers such as flyback converters, available for the generation of negative output voltage. But since the transformer causes overshoot of voltage at the power switches and EMI (Electromagnetic Interference) problems, it leads to a bulkier device with decreased efficiency.

Over the past few years, numerous negative output dc-dc converters have been proposed to mitigate these problems and to efficiently generate negative output voltage such as KY buck, boost, buck-boost converters, self-lift Luo converter, super-lift converter, voltage-lift type converters [5]-[9] etc. However, each of them have their limitations. In devices using voltage lift technique, such as the self-lift Luo, super-lift and

# HIGHLY EFFICIENT Z SOURCE DC-DC BOOST CONVERTER

Mithun Manohar
Student, M.tech, IV Semester
Dept. of Electrical and Electronic
Mangalam College of Engineering
Ettumanur, Kottayam
mithunmanohar.eee@gmail.com

Benny K.K
Associate Professor
Dept. of Electrical and Electronics
Mangalam College of Engineering
Ettumanur, Kottayam
benny.kk@mangalam.in

Susan V Ninan
Associate Professor
Dept. of Electrical and Electronics
Mangalam College of Engineering
Ettumanur, Kottayam
susan.ninan@mangalam.in

*Abstract*— this project deals with the design, analysis, simulation, and development of Highly Efficient Boost DC –DC Converter using Z Source Network. The boost capabilities of the traditional Z-source networks are limited; the proposed converters are composed of combined traditional Z-Source networks in different ways to enhance the boost abilities of the traditional Z-source networks. The proposed converter are satisfy the traditional benefits of Z-source networks with stronger voltage boost abilities which can also be applied to dc-ac, ac-ac, and ac-dc power conversions.. A comparison of the proposed topology has been done in MATLAB/Simulink environment.

***Keywords—DC-DC Converters; Z Source; Inverter; ; Voltage Boosting.***

## I. INTRODUCTION

System involving power converters are being often used in applications like alternative energy sources and hybrid electric vehicle (HEV). Major objective for power electronics designers are efficiency, low cost & reliability. In a PV power system, the output voltages of the PV panels are usually low and vary widely under the influences of climate and environment, therefore, a step-up stage is required .An Z-source inverter can perform buck–boost functions, as compared to the traditional voltage–source inverter. An additional shoot-through zero state is added to the switching states in order to boost the voltage. The design of the step-up dc-dc converters is very important to the PV power systems[2]. The unregulated low dc voltage of PV panels, which cannot be provided for inverters, must be boosted and regulated through the high-gain converters[1]. Then, the step-up converters output regulated high dc voltage to the grid-connected inverters. The application of Z-source networks in dc-dc power conversion is fastest growing area for research.

Therefore, this paper applies the Z-source networks to dc-dc converters with their boost abilities, and proposes a family of hybrid Z-source boost dc-dc converters, which are obtained by combining the traditional Z-source/quasi-Z-source networks in different ways[1].The Z-Source inverter(ZSI) has been introduced in order to overcome the limitations of traditional converter .The ZSI has unique buck-boost capability which ideally gives an output voltage range from zero to infinity regardless of the input voltage. The additional functionality of ZSI over the traditional inverter can be stated not only in terms of boost for DC to AC power conversion but a short circuit across any phase leg is allowed & dead band is not required[11]. The second order filter is provided which is more efficient in suppressing output voltage ripples. The inrush current and harmonics can be reduced.

In this paper, operating principle of Z-source dc-dc Converter is explained, at present, the studies on Z-source networks mainly focus on the field of dc-ac power conversion, while the application of Z-source networks in dc-dc power conversion is essentially required. Therefore, this paper applies the Z-source networks to dc-dc converters with their boost abilities, and proposes highly efficient Z-source boost dc-dc converters[10-13].

The proposed converter is very suited for PV power systems, where the dc-dc converter with high step-up ability is required.
The remainder of this paper is structured as follows. The configurations of the proposed converters are described in detail in Section II. The operating principles and parameters design are presented in Sections III and IV. Section V compares the proposed impedance-source networks with other Z-source impedance networks. Finally, the simulation results

Proceedings of the International Multi-Conference on Computing, Communication, Electrical & Nanotechnology (I2CN-2K18)
held on 26th & 27th April, 2018

# Single Stage Solar PV Fed Induction Motor Driven Water Pump

Nighila Jacob
Student, M.tech, IV Semester
Dept. of Electrical and Electronics
Mangalam College of Engineering
Ettumanur, Kottayam
Nighila485jacob@gmail.com

Shoma Mani
Assistant Professor
Dept. of Electrical and Electronics
Mangalam College of Engineering
Ettumanur, Kottayam
line 4-e-mail address if desired

*Abstract*— The project deals with the design and simulation of single stage solar PV fed Induction Motor driven water pump.In this maximum power is attained with MPPT method.It mainly aimed for hilly areas where electrical power is unable to attain with transmission lines.PI Controller is employed for the speed control.Pertub & Observe MPPT method is employed.PWM method is used for switching Inverter.

*Keywords—MPPT; VSI; PWM; PI Contoller.*

## I. INTRODUCTION

Energy is one of the basic infrastructure for the economic development of a country. Due to modernisation of society the need for electrical energy rises to a sharp extent .To meet the demand the excessive use of fossil fuels led to harness alternative energy resources.The use of non-conventional or renewable energy sources such as wind ,solar etc are some alternative solution for this demand. From the above sources solar energy is the major source of energy.It's potential is 20,000times the world's demand. Utilization of solar energy is great importance to country like India as the sunlight is abundant for major part of year. The major part of application of solar energy is for heating water, used in solar cookers, solar furnaces and solar photovoltaic cells.

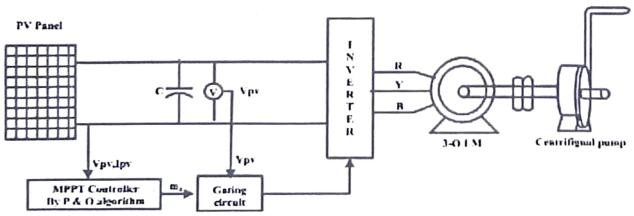



Figure 1.Block diagram of PV fed Induction Motor

Here solar photovoltaic cells are used for the conversion of solar energy directly into electicity for water pumping in rural agriculture purpose.The benefits of solar system are it absorbs the everlasting energy from sun with free of cost,ecofriendly and noice free operation. The solar PV array directly converts the solar energy from the Sun into dc electric power. The generated dc power from the PV array is conditioned or transformed into the required form using Power Conditioning Unit (PCU). The PCU can be any inverter or converter circuit depending on the application of the PV system.

Induction motors are ued in most of the applications due to it's reliability ,low cost and robustness.However, induction motors do not inherently have the capability of variable speed operation. Due to this reason, DC motors found applications in the electrical drives. But the recent developments in speed control methods of the induction motor have led to their large scale use in almost all electrical drives. Induction motors are a constant speed machines which account for 90% of the electrical drives used in Industry. Induction motors are usually constructed to work with a small value of slip, normally less than 5% at full load.

## II. PRINCIPLE OF OPERATION OF PROPOSED SYSTEM

The proposed Induction motor-water pumping based on a single stage solar PV energy conversion system. The solar PV array is directly connected to a inverter which feeds the Induction motor-pump. A DC link capacitor is connected to next to PV to transfer power from PV array to the Induction motor-pump. An Petrub & Observe MPPT technique is adopted for optimum utilization of solar PV array. This technique uses PV voltage and current as the signals to generate an optimum duty ratio, corresponding to the maximum power of solar PV array.

## III. SYSTEM DESIGN AND SPECIFICATIONS

An appropriate design and specifications of Induction motor-pump and solar PV array play a significant role in the desired operation of a water pump. A 4-pole, 1500 rpm, 5hp Induction motor is chosen to drive the water pump. The detailed specifications of Induction motor are shown in Table I. The PV array, DC link capacitor and

Proceedings of the International Multi-Conference on Computing, Communication, Electrical & Nanotechnology (I2CN-2K18) Volume 2 held on 26th & 27th April, 2018

# A NOVEL FLYBACK CONVERTER WITH HIGH EFFICIENCY

Krupa Ann Kurian
Department of Electrical and Electronics
Mangalam College of Engineering
Kottayam, Kerala, India
Krupakurian89@gmail.com

Eugene Peter
Department of Electrical and Electronics
Mangalam College of Engineering
Kottayam, Kerala, India
eugenepeter@mangalam.in

Sreedevi P R
Department of Electrical and Electronics
Mangalam College of Engineering
Kottayam, Kerala, India
sreedevi.r@magalam.in

***Abstract*— This paper proposes a flyback converter with high efficiency compared to conventional flyback converter. The primary stage is similar to that of an Asymmetric Hybrid Converter. Secondary side consists of an active clamp circuit. The LC components in primary and secondary side resonate, aiding in ZVS and ZCS of switches and diodes. Simulation works are done in MATLAB/SIMULINK.**

***Keywords- Dc-dc power converters, Resonance,ZVS,ZCS***

## INTRODUCTION

In Dc Dc converters with isolation a transformer is provided in between to isolate the input and output stages. The electrical isolation is an additional feature and is mainly useful in cases where the input voltage level ($V_{in}$) and output voltage level ($V_{out}$) differs significantly i.e. high or low values of $V_{out}/V_{in}$. The DC to DC converters with isolation is again divided into two types based on polarity of transformer core excitation

Unidirectional core excitation, core is excited with forward currents of only one direction. In these DC to DC converters the isolation transformer core is operated in only the positive part of B-H curve.

Bidirectional core excitation, core is excited with currents in either direction. In these DC to DC converters the isolation transformer core is operated alternatively in positive and negative portions of B-H curve. Some of the commonly used DC to DC converters with isolation are Cuk converter (can be used in nonisolated mode also ),Fly back converter, Forward converter, Full bridge converter, Half bridge converter, Push-pull converter etc.

Flyback converters are simple compared to other topologies used in low power application. High voltage and current stress across the switches is one of the drawbacks of these converters. In order to overcome the drawbacks many topologies with several soft switching techniques are developed [1-8]

There are primary side and secondary side regenerating flyback converters. The main drawbacks of these converters are switching losses and reverse recovery voltages across the diodes.

Many topologies that use active clamp circuits in their secondary side are developed. The most common topologies are AHB with voltage double circuit in secondary and Dual Resonant converter with voltage doubler circuit in the secondary. ZCS of power switches can be achieved by using Active Clamp Circuit. It also aids in ZCS of diodes. A resonant inductor is usually added to active clamp circuit to achieve soft switching.

The asymmetrical Half Bridge Converter has primary stage that resembles a flyback converter and secondary stage similar to that of a Half bridge converter. They use an inductor in primary circuit to achieve ZVS of main switch. The main disadvantage of this converter is the voltage ringing problem due to the resonance between inductors and parasite diodes. Also the inductance value must be high to achieve ZVS.[7-9]

The dual resonant converter achieves ZVS turn on of switches by using magnetizing inductance $L_m$ in the primary. The primary stage consist of an active clamp structure and the secondary circuit consist of a leakage inductance to achieve ZCS of diodes. But the main disadvantage is the high voltage stress and current stress across the switches and diodes.[10-12]

The proposed dc – dc topology make use of a blocking capacitor $C_B$ in the primary and a resonant inductor with a voltage clamping circuit at the secondary ZVS and ZCS of switches and diodes are respectively realized. The circuit topology operating principles, Design and Stimulation results are explained in following sections.

## PROPOSED TOPOLOGY

This paper proposes an efficient ZVS and ZCS flyback topology. Its primary is same as that of an Asymmetric Half Bridge Converter and secondary is provided with active clamp circuit and a resonating inductor. The magnetising inductance $L_m$ , resonates with the blocking capacitors $C_B$ aiding ZVS of switches. Secondary side is provided with a resonance inductor and clamping circuit so that diode current $I_{D1}$ and $I_{D2}$ flows as $L_r$ resonates with the capacitors resulting in ZCS of diodes. Clamping circuit provided in the secondary clamps the reverse recovery voltage across the diodes to the output.

### *A.* Circuit Diagram

The proposed converter consist of blocking capacitor $C_B$, main switch $S_1$, auxillary switch $S_2$,magnetizing inductance $L_m$ in the primary and resonating inductance Lr ,capacitors $C_1$,$C_2$ acting as resonance capacitors and Output capacitor $C_0$ at the secondary. MOSFET is used as the switches and its parasitic capacitance and diodes are also considered for analysis.

Proceedings of the International Multi Conference on Computing, Communication, Electrical& Nanotechnology (I2CN-2K18) held on 26th and 27th April,2018

# High Voltage Gain Transformerless Boost Converter

Dunny Susan Thomas
*MTECH Student*
*Department of Electrical and Electronics Engineering*
*Mangalam College of Engineering*
*Ettumanoor, Kottayam*
email: dunnysusan27@gmail.com

Jeneesh Scaria
*Assistant Professor*
*Department of Electrical and Electronics Engineering*
*Mangalam College of Engineering*
*Ettumanoor, Kottayam*
email: jeneesh.scaria@mangalam.in

***Abstract*** **- In this paper, a high voltage gain transformerless boost converter is proposed. The voltage gain of the proposed converter is higher than that of the traditional boost and three level boost converters. With appropriate duty cycle, high output voltage can be obtained. The proposed converter have higher conversion ratio. Low voltage stress and current stress across the power switch can be achieved. The working principle and the mathematical analysis of the proposed converter are explained. The performance of the presented converter are verified by using MATLAB.**

**Index Terms – Boost converter, power switch, voltage gain, voltage stress.**

## I. INTRODUCTION

Now a days, switching mode power supply is widely used in the modern power conversion technology. Based on the switching mode power supply, many converter topologies have been proposed. Buck, boost and buck boost converters are the basic converter topology which has simple structure. The voltage bucking/ boosting converter can regulate output voltage under wide range of input voltage. Other converters are developed and modified based on these basic converters. As these converters have limited voltage gain and are restricted to low or high output voltage for extreme duty cycle.

In addition, for high step up applications, semiconductor devices have higher losses and thereby decreases the efficiency of the converter. Since high rating switching devices are used. Therefore traditional boost converters are not suitable for high step up applications. So many researchers have modified these traditional boost converter and developed different method to obtain high voltage gain converter.

A new step up converter has been developed by applying voltage lift technique. These converters have high output voltage and better characteristics than traditional converters. But have high cost, volume and losses and also the complexity of the circuit is high [2]. Interleaved non isolated high step up dc/dc converter has been developed which consists of some diode capacitor multiplier cells and two basic boost cells. Voltage conversion ratio is enlarged by the presence of DCM cells, thereby extreme large duty ratio can be avoided for high step up. In addition to that the voltage stress of the switching devices is lower than that of the output voltage. Hence lower voltage power switches can be employed. As the two basic boost cells are controlled by the interleaving method. i.e., phase difference between the two PWM signals is 180° and the input current can be obtained by the sum of the two inductor currents. So the input current ripple is decreased which reduce the size of the filter. But the operating mode of the converter structure and the control strategy are very complex [3].

Many step up converters have been proposed to obtain high efficiency and high voltage gain. But this can be achieved by increasing the turn's ratio of transformer. Voltage spike across the power switch is very high so that the power switch gets destroyed. Also, the reverse recovery problem affect the efficiency of the converter [4-9].

In [10] a coupled inductor type converter is proposed for high voltage gain. But it has high voltage spikes because of the presence of leakage inductance, thereby it increases the voltage stress. Another topology used for high voltage gain is achieved through a high conversion ratio bidirectional dc-dc converter. It uses dc blocking capacitor on the high voltage side to reduce the voltage across the transformer. Also to reduce output current ripple, it uses current doubler circuit in the low voltage side. But it increases the complexity of the circuit thereby the cost of the circuit increases. It also increases the conduction loss as it has five power switches and hence decrease the efficiency [11].

Wai and etal introduces a high efficiency dc/dc converter with high voltage gain. The coupled inductors in the converter improves the step up function and efficiency. But the leakage inductance introduces high surge voltage. So it may require to use high voltage rating devices [12].

In [13] voltage boosting converter which combines a charge pump and a coupled inductor with the turn's ratio. It improves the disadvantages of the traditional boost converter. In [14] a multi-output topology is introduced. It has several output voltages but the circuit is very complex as many power switches have been used.

A high voltage gain transformerless boost converter is proposed in this paper which has high voltage gain and low voltage stress on the power switch. The voltage gain of the proposed converter is four times as that of the traditional boost converter and twice as high as that of the conventional three level boost converter. Moreover, the current stress of the switches can be reduced by this topology. The operating principle and the mathematical analyses of the proposed topology are explained and performance are validated by using simulation results.

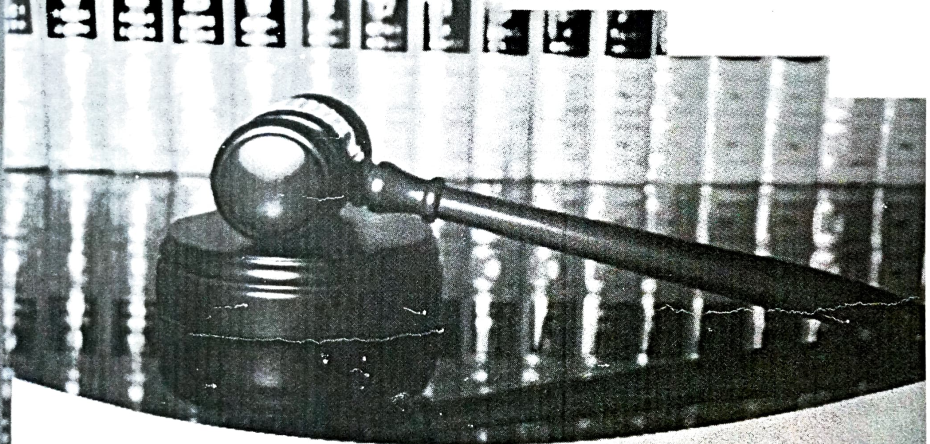
## II. HIGH VOLTAGE GAIN TRANSFORMERLESS BOOST CONVERTER

A new transformerless boost converter is obtained by inserting an additional inductor to a conventional three level

KTU

MBA

# Business Law



MBA 2nd Trimester

Dr. K. V. S. Raj

Fathima Shirin Shaji

THAKUR PUBLICATION PVT. LTD.
KERALA

MBA Business Law 2nd Trimester

Printed at Saeed Printing Press Jankipuram, Lucknow. Mob. 9235318686/07

simple language with detailed information. The text is supported with numerous illustrations to enable practical understanding. This book also contains previous year solved paper and exercises to assist the students in preparing for the examinations.

## About the Author

**Dr. K. V. S. Raj** is currently working as **Professor at Nehru College of Engineering and Research Centre, Nehru School of Management, Thrissur.** He has done **MMM, PGDMM, M.Phil** and **Ph.D** in Management. He has attended many Seminars and Workshop at National and International Level. He has also Published many papers in the National & International Journals. He has taught diverse set of subjects like Organizational Behaviour, Consumer Behaviour, Business & Society, Business Ethics, Business Law, Engineering Economics and Principles of Management, Marketing Management and Indian Ethos, etc. He is having **7 years** of experience in teaching and 23 years' experience in industry. His areas of specialisation are: Marketing, Advertising, Sales, Strategic Marketing, Retail, Rural Marketing, Strategic Management, Business Environment, Organisational Behaviour, HRM, Training & Development, Pharmaceutical Management and Marketing. He is multi-faceted seasoned Professional having over 30 years of rich & dynamic experience in Teaching, Training & Development, Sales, across industry verticals and a keen strategist & planner, with excellent communication & exceptional interpersonal and man management skills with the ability to motivate a large strength of men under adverse circumstances. Result oriented, dynamic, timely accurate reporter.

**Ms. Fathima Shirin Shaji** is currently working as **Assistant Professor at Mangalam College of Engineering, Kottayam.** She has done **M.com** (Finance) from M.G. University, Kerala, and cleared **UGC-NET**, a national level examination for lectureship. She has presented many Research Paper at various International and National Conferences and has also attended many Seminars and Workshops. Her areas of interest include all the finance related subjects like Accounting for Managers, Financial Management, Financial Markets and Services, Tax Management, Business Law, etc.

**APJ Abdul Kalam Technological University, Kerala, MBA – 2nd Trimester**

| Subject Name | Author/ Editor Name |
|---|---|
| Organisational Behaviour-II | Prof. (Dr.) George V Antony, Prashanth P John |
| Business Environment | Dr. T. Dhanalakshmi, Prof. Roy Samuel |
| Marketing Management-I | Veera Thakur, Pranav Bisariya |
| Operations Management | Priyanka Singh |
| Financial Management-I | Prof. (Dr.) C. K. Madhusoodhanan |
| Business Law | Dr. K. V. S. Raj, Fathima Shirin Shaji |

**MRP: ₹210**

THAKUR PUBLICATION PVT. LTD.
KERALA
www.tppl.org.in

ISBN: 978-93-87093-68-3

KTU MBA Business Law 2nd Trimester

Printed at Saveera Printing Press Jankipuram, Lucknow Mob: 9235318607

PRINCIPAL
MANGALAM COLLEGE OF ENGINEERING
Ettumanoor

## BOOKS & JOURNAL PUBLICATIONS

- Co-authored an academic book – "Business Law" for MBA students in APJ Abdul Kalam Technological University, Kerala. ISBN :978-93-87093-68-3

PRINCIPAL
MANGALAM COLLEGE OF ENGINEERING
Ettumanoor