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Department of ***Electrical and Electronics Engineering***

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Department of Electrical and Electronics Engineering

International Conference
on
"Recent Developments in Power Engineering (ICRDPE - 21)"

Patron, Program Chair
&
Editor in Chief

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Principal and Professor in CSE department, SMEC (Autonomous)

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Sri.M. LAXMAN REDDY
CHAIRMAN

MESSAGE

I am extremely pleased to know that the Department of Electrical and Electronics Engineering of SMEC is organizing Online International Conference on **"Recent Developments in Power Engineering" (ICRDPE - 21)** on 9th and 10th of July 2021.

I understand that the large number of researchers has submitted their research papers for presentation in the conference and for publication. The response to this conference from all over India and Foreign countries is most encouraging. I am sure all the participants will be benefitted by their interaction with their fellow researchers and engineers which will help for their research work and subsequently to the society at large.

I wish the conference meets its objective and confident that it will be a grand success.

M. Laxman Reddy

M. LAXMAN REDDY
Chairman

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Sri. G. CHANDRA SEKHAR YADAV
EXECUTIVE DIRECTOR

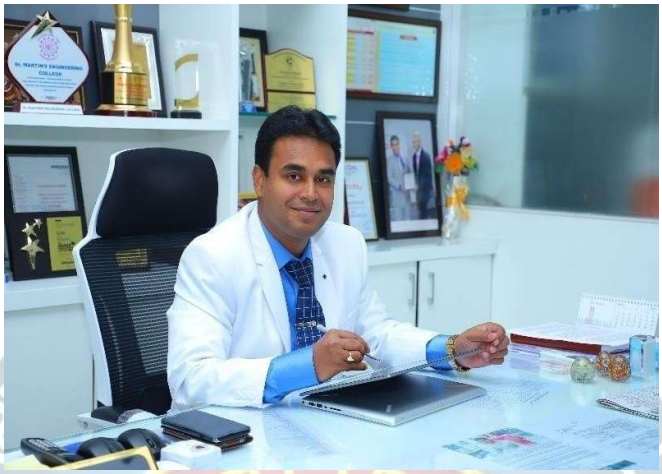
I am pleased to state that the Department of Electrical and Electronics Engineering of SMEC is organizing Online International Conference on "Recent Developments in Power Engineering" (ICRDPE - 21) on 9th and 10th of July 2021. For strengthening the "MAKE IN INDIA" concept many innovations need to be translated into workable product. Concept to commissioning is a long route. The academicians can play a major role in bringing out new products through innovations.

I am delighted to know that there are large number of researchers have submitted the papers on Interdisciplinary streams. I wish all the best to the participants of the conference additional insight to their subjects of interest.

I wish the organizers of the conference to have great success.

G. CHANDRA SEKHAR YADAV
Executive Director

Dr P. SANTOSH KUMAR PATRA
PRINCIPAL



I am delighted to be the Patron & Program Chair for the **Online International Conference** on **"Recent Developments in Power Engineering" (ICRDPE – 21)** organized by the Department of Electrical and Electronics Engineering on 9th and 10th of July 2021. I have strong desire that the conference to unfold new domains of research among the Electrical Engineering fraternity and will boost the knowledge level of many participating budding scholars throughout the world by opening a plethora of future developments in the field of Electrical Engineering.

The Conference aims to bring different ideologies under one roof and provide opportunitiesto exchange ideas, to establish research relations and to find many more global partners for future collaboration. About 126 research papers have been submitted to this conference, this itself is a great achievement and I wish the conference a grand success.

I appreciate the faculties, coordinators and Department Head of Electrical and Electronics Engineering for their continuous untiring contribution in making the conference a reality.

Dr P. SANTOSH KUMAR PATRA
Principal

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CONVENER

The world is always poised to move towards new and progressive engineering solutions that results in cleaner, safer and sustainable products for the use of mankind. India too is emerging as a big production center for world class quality. Electrical and Electronics Engineering play a vital role in this endeavor.

The aim of the online International Conference on **"Recent Developments in Power Engineering" (ICRDPE – 21)** being conducted by the Department of Electrical and Electronics Engineering of SMEC, is to create a platform for academicians and researchers to exchange their innovative ideas and interact with researchers of the same field of interest. This will enable to accelerate the work to progress faster to achieve the individuals end goals, which will ultimately benefit the larger society of India.

We, the organizers of the conference are glad to note that more than 126 papers have been received for presentation during the online conference. After scrutiny by specialist 37 papers have been selected, and the authors have been informed to be there at the online platform for presentations.Steps have been to publish these papers with ISBN number in the Conference Proceedings and all the selected papers will be published in Scopus / UGC recognized reputed journals.

The editorial Committee and the organizers express their sincere to all authors who have showninterest and contributed their knowledge in the form of technical papers. We are delightedand happy to state that the conference is moving towards a grand success with the untiringeffort of the faculties of Department Head of Electrical and Electronics Engineering of SMEC and with the blessing of the Principal and Management of SMEC.

Dr. N.RAMCHANDRA
HOD, EEE

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THE EFFECTS OF VARIOUS SUPPLY MODES ON LINEAR INDUCTION MOTOR OUTPUT

Dr. Ramchandra Nittala[1] **Dr. P. Santosh Kumar Patra[2]**

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Abstract

The modelling of traction linear induction motors (LIMs) for public transportation is the subject of this article. Because of the magnetic end effect, the phase impedances of these motors are asymmetric. When a three-phase symmetrical voltage is used to power the LIM, the phase currents become asymmetric. When simulating the efficiency of the LIMs, this effect must be taken into account. Otherwise, the simulation results are incorrect because the motor phase currents are believed to be symmetric. The performance of the LIM is investigated in this paper, taking into account the end-effect induced asymmetry of the phase currents, and a comparison of the LIM performance characteristics in both the voltage and current modes is presented.

Keywords- *finite element analysis, linear induction motor, Péclet number, end-effect.*

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A REVIEW PAPER ON ACTIVE FILTERS

Mr. K. V. Govardhan Rao,
Assistant Professor, St. Martin's Engineering College, Kompally, Secunderabad - 500100.

Abstract

This paper is proposed for the review of active filters and its various applications. As we know that due the intensive use of power converters and other non-linear loads in industry and by consumers in general, it can be observed an increasing deterioration of the power systems voltage and current waveforms.
The presence of harmonics in the power lines results in greater power losses in distribution, interference problems in communication systems and, sometimes, in operation failures of electronic equipment, which are more and more sensitive since they include microelectronic control systems, which work with very low energy levels. Because of these problems, the issue of the power quality delivered to the end consumers is, more than ever, an object of great concern.
International standards concerning electrical power quality (IEEE-519, IEC 61000, and EN 50160, among others) impose that electrical equipment and facilities should not produce harmonic contents greater than specified values, and also specify distortion limits to the supply voltage. Meanwhile, it is mandatory to solve the harmonic problems caused by those equipment already installed.
Passive filters have been used as a solution to solve harmonic current problems, but they present several disadvantages, namely: they only filter the frequencies they were previously tuned for; their operation cannot be limited to a certain load; resonances can occur because of the interaction between the passive filters and other loads, with unpredictable results. To cope with these disadvantages, recent efforts have been concentrated in the development of active filters.

Keywords - *Active filtering method, harmonic, p-q theory.*

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SMART GRID TECHNOLOGY: AN OVERVIEW

T. V. Sai Kalyani,
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Abstract

Smart grid has been replaced with traditional electrical power grid with its various technologies. In today's world smart grid has emerged in as solution of increasing demand. They deliver energy at low cost and high quality as possible. The smart grid successfully uses of renewable energy resources and smart pricing technique in order to achieve energy efficiency. Information communication technology helps the grid in collection of data from various consumers. Basically advanced metering infrastructure comprises of collection, storing and using energy usage data are assumed to be the main tool of smart grid. So AMI transfers data from smart meter to the utility consumer. There is another tool like phasor measurement unit which measures the state of electric power grid. It increases the power transfer capacity. This review paper deals with the role of smart grid technology.

Keywords *— Smart grid, advanced metering infrastructure, load forecasting, demand side management.*

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A REVIEW STUDY ON AXIAL FLUX MACHINES AND ITS APPLICATIONS

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Abstract

This paper presents a thorough review concerning the design types of axial flux permanent magnet machines (AFPM) in terms of different features such as construction, design, materials, and manufacturing. Particular emphasis is given on the design and its effect on the performance AFPM machines. First of all, early and modern axial flux machines are mentioned. Secondly, rotor construction of different axial flux machines is described, then different stator constructions are mentioned depending upon the presence of slots and stator back iron. Then, according to the arrangement of the rotor stator structure, the machines are classified into single, double, and multi-stack arrangements. Advantages, disadvantages, and applications of each type of rotor and stator are pointed out. Finally, on the basis of the reviewed literature merits, demerits, features and application of different axial flux machines structures are explained and clarified. Thus, this paper provides connection between the machines that are currently being used in industry and the developments of AFPM throughout the years.

Keywords *– Axial flux machines, axial flux machine applications, PM machines, slot-less machines, slotted machines.*

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ACTIVE AND PASSIVE CELL BALANCING IN HYBRID ELECTRIC VEHICLE

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1,2 Assistant Professor, Department of Electrical and Electronics Engineering, St.Martin's Engineering College, Secunderabad - 500100.

Abstract

Cell Balancing process is crucial for keeping battery lifespan and protecting the battery cell in hybrid electric vehicles. Li-ion batteries are the most used cells in hybrid electric vehicles. These batteries are influenced by various features such as over-voltage, undervoltage, overcharge and discharge current, thermal runaway, and cell voltage imbalance etc. Due to cell imbalance the battery capacity may decrease very rapidly. Here comes the importance of battery monitoring and balancing system. Monitoring system is used to monitor the cell voltage levels in a pack of cell. To increase the lifetime of the battery pack, the battery cells should be frequently equalized to keeps up the difference between the cells as small as possible. Passive and Active cell balancing methods are the two important cell balancing methods used to equalize the charge level in a pack of cell. These methods are based on cell voltage and state of charge (SOC). The passive cell balancing technique equalizing the SOC of the cells by the dissipation of energy from higher SOC cells and formulates all the cells with similar SOC equivalent to the lowest level cell SOC. The active cell balancing transferring the energy from higher SOC cell to lower SOC cell, hence the SOC of the cells will be equal.

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ISLANDING AND CONNECTED MODE CONTROL OF MICROGRID

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Abstract

In common practice a Microgrid can operate while connected to a MV network. When a preplanned or unplanned event like holding or occurring fault occurs in the MV network itis possible to cause the islanding state in the Microgrid. In this Paper the operation of the MV network in the islanding mode and how to control the Microgrid by using the controlling structure are investigated. In this paper the conventional droop method has been described and a new controlling methods for controlling the Microgrid are also proposed which in the first method the AC power theory for the controlling of the Microgrid. For comparing these two methods with the controlling method which is proposed in reference [14], these three methods have been simulated with PSCAD/EMTDC software.

Keywords - *Connected mode, DG, Droop method, Islanding mode, Microgrid, SPWM, Hysteresis Switching, Fuels Cell, Micro turbin.*

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MODELING AND SIMULATION OF A BATTERY, SOLAR, AND FUEL CELL HYBRID ELECTRIC VEHICLE'S POWER SYSTEM

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Abstract

To meet the never ending fuel demand of the vehicle, Hybrid Vehicle was introduced in the research. Generally a hybrid vehicle is the combination of an internal combustion engine (ICE) and electrical drive system. The performance of the vehicle is largely dependent on the accuracy and efficiency of the electrical system of the vehicle powertrain. This paper analyzed an electrical system for the powertrain of Hybrid Electric vehicle which is powered by Fuel cell, Battery and PV panel. A Simulink model is prepared and simulated successfully. Permanent magnet synchronous motor drive system is used in the Simulink model. The simulation results like rotor speed, electromagnetic torque, current, DC-DC converter current, voltage, state of charging, grid charger performance, photovoltaic panel performance and mechanical torque are discussed and compared with the state of the art methods. Including this the research also compared the performance of energy storage system with the reference which is frequently used in the electrical system of the HEV.

Keywords— *Hybrid electric vehicle; Power system of vehicle; Fuel cell vehicle; Solar vehicle.*

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HYBRID POWER QUALITY COMPENSATOR INTERFACED WITH FUZZY FOR HIGH-SPEED LOCOMOTIVE SYSTEMS

Daniel Manoj Nethala
Assistant Professor, St. Martin's Engineering College, Kompally, Secunderabad – 500100.

Abstract

Implementation of fuzzy logic controller in place of classical controller attains good response, low THD values, voltage as feedback for significantly improving the dynamic performance of proposed HPQC module. With increase in traffic and speed railway became one of the major load on supply grid. AC-DC converters used in locomotive of traction system draws rich harmonics content current results in poor power quality and failure or missed operation of utility causing derating of grid and affect the reliability. A hybrid power quality compensator (HPQC) is proposed for comprehensive compensation under minimum dc operation voltage in high-speed traction power supplies. Reduction in HPQC operation voltage can lead to a decrease in the compensation device capacity, power consumptions, and installation cost. It is shown through simulation results that similar compensation performances can be provided by the proposed HPQC with reduced dc-link voltage level compared to the conventional railway power compensator. The co phase traction power supply with proposed HPQC is suitable for high-speed traction applications. In this study, the renewable energy sources are used as the supply to the proposed concept. For the high response and achieving the fast steady the system can be controlled the proposed concept with the fuzzy logic controller.

Keywords - *Co Phase System, Power Quality Compensator, Fuzzy Controller, Reactive Power Compensation, Traction Power, Unbalance Compensation.*

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A DC FAST CHARGER WITH BUCK AND BOOST FUNCTIONS AND SIMULTANEOUS DRIVE/CHARGE CAPABILITY THAT IS INTEGRATED INTO THE DRIVETRAIN

CH. Srinivas
Assistant Professor, St. Martin's Engineering College, Kompally, Secunderabad – 500100.

Abstract

Electric vehicles have the potential to change the global driving paradigm, significantly reducing the environmental impact of transportation systems. However, charging infrastructure cost and range anxiety impose challenges on rapid technology adoption. This paper proposes an onboard integrated dc charger, leveraging the traction inverter, and motor winding inductance to ensure the minimum incremental mass. The proposed circuit allows the vehicle to connect directly to emerging dc microgrids, utility storage, or renewable energy resources. The system is compatible with power supply voltages higher or lower than the vehicle battery, offering the possibility to charge 400-V batteries from emerging 1000-V supplies, as well as 800-V battery from the existing 600-V dc interfaces. The presented method also provides bidirectional fault blocking capability and bidirectional power transfer, suitable for V2G, G2V, or V2V operation. In addition, this paper proposes simultaneous driving and charging, especially useful for semitrailer trucks applications, significantly increasing operational range. The solution presented in this paper offers a simple and safe charging scheme with the potential to substantially reduce charging infrastructure cost and address range anxiety.

Keywords *- Bidirectional fault blocking, bidirectional power transfer, dc fast charging, electric vehicles (EVs), integrated dc charging.*

ISBN: 978-81-948785-3-7

POWER-LINKED PREDICTIVE CONTROL STRATEGY FOR POWER ELECTRONIC TRACTION TRANSFORMER

Ch.Nirosha
Assistant Professor, St. Martin's Engineering College, Kompally, Secunderabad – 500100.

Abstract

Power electronic traction transformer (PETT) is a module-cascaded converter with high-frequency-link technology to realize high power conversion. A typical structure of PETT contains a single-phase cascaded H-bridge rectifier in the first stage and several dual active full-bridge DC-DC converters in the second stage. For PETT adopting such complex topological structure, the control strategy also becomes complicated and should be carefully designed. In this paper, a power-linked predictive control strategy for PETT is proposed based on the predictive controls of H-bridge rectifier and dual active fullbridge DC-DC converter. A power link is brought into the control strategy to connect H-bridge rectifier with DC-DC converter, through which the input power of PETT can match the output power. Moreover, the voltage balance control and power balance control are also combined with predictive control by power-linked predictive control strategy. Using such strategy, the fluctuation of H-bridge rectifier DC voltage is suppressed, the circumfluence among modules is reduced, and the dynamic and steady-state performances are both improved compared with traditional strategy. Simulation and experimentation platforms with both resistance load and motor load are built to show the effectiveness and correctness of power-linked predictive control strategy.

Keywords *- Cascaded H-bridge Rectifier (CHB), Dual Active Full-Bridge DC-DC Converter (DAB), Power Electronic Traction Transformer (PETT), Power-Linked Predictive Control Strategy (PLPC), Performance Improvement.*

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FSIG VOLTAGE STABILITY IMPROVEMENT IN GRID CONNECTED WIND FARMS USING FLC-STATCOM CONTROLLER

T. Penchalaiah[1], G. Sridhar Babu[2]

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Abstract

The main aim of this project is STATCOM control structure with the capability to coordinate the control between the positive and the negative sequence of the grid voltage is proposed. The main using STATCOM to increase voltage stability by compensating the reactive power in the power system. This paper investigates the Static Synchronous Compensator (STATCOM) application to achieve continuous operation of wind turbine. Wind turbines are of an variable-speed type using either a doubly fed induction generator (DFIG) or permanent-magnet synchronous generator, a non-negligible percentage of 15% of the operating wind turbines is still of the fixed-speed induction generator (FSIG)-type connecting directly to the grid. Because this generator type cannot provide reactive power control, it cannot fulfil the demanding grid code requirements without additional device. During voltage dips, the induction generators may consume a large amount of reactive power as their speed deviates from the synchronous speed. A STATCOM controller is connected to an FSIG-based wind turbine and used to control the positive- and the negative-sequence voltage during grid faults conditions. While the positive-sequence voltage compensation leads to an increase the voltage stability level of the wind turbine, the negative sequence voltage compensation leads to a reducing of rippling torque, increasing the lifetime of the generator drive train. In this project control technique is PWM Technique with fuzzy logic controller in improving the performances of voltage stability and reducing the reactive power losses. The simulation work has been done in MATLAB/SIMULINK software.

Keywords - *Induction generator, low-voltage ride through, STATCOM, wind energy., Fuzzy logic controller (FLC).*

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ENERGY MANAGEMENT SYSTEM FOR AN HYBRID ELECTRIC VEHICLE, USING ULTRACAPACITORS AND NEURAL NETWORKS

G. Esha
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Abstract

A highly efficient energy management system for hybrid electric vehicles (HEV), using neural networks (NN), was developed and tested. The system minimizes the energy requirement of the vehicle and can work with different primary power sources like fuel-cells, microturbines, zinc-air batteries or other supply with poor ability to recover energy from regenerative braking, or with scarce power capacity for fast acceleration. The experimental HEV uses lead-acid batteries, an ultracapacitor bank, and a brushless dc motor with a nominal power of 32 kW, and a peak power of 53 kW. The control system, based on a DSP, measures and stores the following parameters: primary source voltage, car speed, instantaneous currents in both terminals (primary source and ultracapacitor), and actual voltage of the ultracapacitor. The increase in range with ultracapacitors has been around 5.3 % in city tests, compared when only lead acid batteries are used, but when optimal control with NN is used, this figure increases to 8.9 %. The car used for this experiment is a Chevrolet LUV truck, similar in shape and size to a Chevrolet S-10, which was converted to an electric vehicle at the Universidad Católica de Chile. Numerous experimental tests under different conditions are compared and discussed.

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PERFORMANCE ANALYSIS OF NON-ISOLATED HIGH STEP-UP DC-DC CONVERTER TOPOLOGIES USED IN PHOTOVOLTAIC GRID CONNECTED ELECTRIC VEHICLE CHARGING STATIONS.

B. Sampath Kumar
Assistant Professor, St. Martin's Engineering College, Kompally, Secunderabad – 500100.

Abstract

This paper presents performance analysis of widely used hard switched high step-up dc-dc converter topologies in electric vehicle(EV) or plug-in hybrid electric vehicles or in photovoltaic grid connected applications. It is evident from the literature that PV parallel connected configuration is better in terms of efficiency over series connected configuration under partial shaded condition. On the other hand, the electric vehicle charging stations or grid connected PV vehicle demands higher front end dc voltage level; therefore, this paper reviews popular high step-up dc-dc converter topologies in terms of switch count, startup currents and passive components for a fixed voltage gain.

Keywords *— Batteries, chargers, high step-up, power electronics, photovoltaic grid connected switched mode, step-up dc-dc converter.*

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BATTERY MANAGEMENT SYSTEMS FOR LITHIUM ION BATTERIES IN ELECTRIC VEHICLES

Sk.Syed Hussain[1], Voruganti Bharath Kumar[2], P Harika Reddy[3]
[1]Assistant Professor, KG Reddy College of Engineering and Technology, Moinabad, Rangareddy, Telangana.
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Abstract

Electric vehicles play a critical role in reducing greenhouse gas emissions and carbon pollution. In electric vehicle applications, rechargeable batteries are employed to power the auxiliary systems and motor. For electric vehicle uses, various categories of rechargeable batteries are currently available. Because Lithium Ion Batteries have a low self-discharge rate, a wide operating range, a high energy density, and a long life cycle, they will be the most efficient rechargeable batteries for electric mobility. Battery management systems are used to optimize battery quality and ensure safe operation, and they play an important part in the application of Electric Mobility. This study examines the characteristics of battery management systems and their technology, as well as their benefits and drawbacks in the context of electric car applications. Battery cell monitoring, state estimates, charging and discharging control, temperature management, fault analysis, data collecting, and protective schemes are all covered in this review to help improve battery performance for EV applications.

Keywords—*State Estimation, Battery Management Systems, Electric Vehicles, Lithium-Ion Batteries, Cell Balancing.*

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S-F CELL BASED MULTIPORT DC-DC CONVERTER

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Abstract

This paper proposes a Renewable S-F cell Based Multiport Dc-Dc Converter with dual input of solar, fuel cell and dual output in case 1and in case 2 with dual input of solar, fuel cell and single output. As the conventional sources are tends to depleting, the alternative ways are chosen to generate electrical power nothing but non-conventional energy sources. Energy conversion always involves a DC section. So it is mandatory to focus on the DC-DC converters. As huge progress takes place in power electronics field, multiport converters are one of the greatest deals. It treats the whole system as a single power converter, gives high efficiency. Multiport dc-dc converters are compact in structure with fewer components, lower cost compared to numerous DC-DC converters. The existing topology of the multiport DC-DC Converter used four switches but the proposed topology used only two switches results in reduction of switching losses and the output voltages are high and regulated. The closed loop PI controlling strategy is adopted. The results were verified by using MATLAB simulink Software.

Key words: *S-Fuel, Multiport, dual input, Dual Output, single output, DC-DC Converter.*

ISBN: 978-81-948785-3-7

VOLTAGE MITIGATION EMPLOYING SMART LOADS WITH HIGH PENETRATION OF RENEWABLE ENERGY IN DISTRIBUTION SYSTEM

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Abstract

This paper deals with modeling and control of smart loads for demand-response management under increased penetration of renewable power generations (RPGs) at distribution level. The increased penetration of RPGs, particularly wind energy at distribution level, is associated with adverse impact on voltage quality. A permanent magnet synchronous generator based variable speed wind energy conversion system is modeled with a wind speed considering stochastic and periodic effects. The emulated wind power into the distribution system produces stochastic and periodic power variations. For the load demand response management, full-bridge self-commutated switches based converters are employed to control smart loads (SLs). These SLs are controlled for participating in grid bus voltage regulation and flickers mitigation. From various case studies, it is found that SLs are effective in improving the voltage profiles of the test feeder.

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IOT-BASED SMART OUTLET FOR AN AUTONOMOUS ELECTRICAL SAFETY MANAGEMENT SERVICE

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Abstract

At present, individual households within a multifamily residential are at vulnerable to electrical accidents. As if during a blind spot, they can't be covered under electrical safety management. This paper presents issues about an autonomous electrical safety management service which uses smart outlets to make sure electrical safety for individual households. Risk factors surrounding electrical incidents occurring during a mashup tech-based environment were analyzed and a sensible outlet equipped with a prediction technique was developed. Additionally to the present, an autonomous electrical safety management service scenario was developed to handle mechanical failures in autonomous electrical safety devices which run on IoT-based smart outlets. By utilizing such an autonomous electrical safety management service model, technology for electrical safety security was developed for individual households or each residential unit in multi-dwelling unit. The correlation among voltage, current, and 0 phase current was analyzed to spot the danger factors of electrical accidents and to predict accidents. In order to detect arc faults, a replacement prediction technique was developed. The technique the techniques applied to research nonlinear models like an arc fault show the diversity within the application areas of traditional fast Fourier transform (FFT) algorithms. Furthermore, by using such a way for electrical accident prediction, an autonomous electrical safety management model was developed. Thus, a measure to make sure micro-grid electrical safety was presented. There's the hope that this development of the management technique for individual households in reference to the fourth industrial revolution would contribute to electrical safety.

Keywords—*Electrical safety, autonomous management service, IoT adaptor, smart outlet, mashup, effective leakage current, over current, arc fault.*

ISBN: 978-81-948785-3-7

MODELING AND ANALYZING OF BI-DIRECTIONAL ELECTRIC VEHICLE CHARGER

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Abstract

Whenever we talk about Electric Vehicles, one of the key factors we must consider the Charging infrastructure for ensuring a smooth transition. Most of the EV chargers are designed to work in Uni-direction. Still, Bi-directional chargers add the benefit of EVs by enabling energy transfer from vehicle to grid or vehicle to home as well as charging from grid to vehicle.

In this paper, we will discuss the modeling and analysis of the Bi-direction Electric Vehicle Charger that has innovative modes for the charging control of lithium-ion batteries concerning SOC. The proposed charging control is validated by MATLAB/Simulink integrated with the grid model provides primary EV charging and discharging scenarios.

Keywords: *Electric vehicle, Battery charger, charging infrastructure, Vehicle-to-grid, Grid-to-vehicle operation, and SOC.*

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FUTURE OF ELECTRIC VEHICLES IN INDIA

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Abstract

Over recent years, the exploitation and pollution of natural resources have created the need for renewable and environment-friendly products. One of these products is Electric Vehicles. Electric Vehicles are the replacement for fuel-based vehicles. They are one of the emerging technologies as well as eco-friendly and viable. The replacement of internal combustion engines with electric engines will reduce pollution to a great extent and be profitable to consumers. Many countries around the globe have implemented this technology and are contributing towards amelioration of the environment. We are going to see the future of electric vehicles in India and the opportunities and challenges faced in India over implementing electric vehicles.

Keywords— *Electric Vehicle, Consumer perception, Environment, Government policies.*

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PLC BASED MULTI CHANNEL FIRE DETECTION AND ALARM SYSTEM

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Abstract

The fire alarm system is used to detect the fire and alert (or) warn people through visual or any audio appliances .There are so many dangerous smoke (or) chemicals present in fire . Which may lead to take the major lives and mostly this fire accident are occurs in industries than in any area. Welding, torch cutting which can also transmit the fire in to the air and they will be some dangerous liquid which can catch the fire and creates more spread of fire. The fire is one of the most common problem. To overcome all this issues, we have proposed a Multi-channel fire alarm system. This PLC based fire alarm system detects the fire, smoke there will be buzzer which alerts the people and it will disconnect from the main supply and the emergency exit door motor to escape from the fire. Lift comes to ground level and then the water pump motor will pump the motor to the fire to control the spread of fire and finally the doors will automatically be opened.

Key words: *PLC, Fire, heat, water pump, Sensors.*

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ADVANCED DRIVE SYSTEM FOR DC MOTOR USING MULTILEVEL DC/DC BUCK CONVERTER CIRCUIT

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Abstract

This paper presents a new topology of clamped diode multilevel DC/DC buck power converter for a DC motor system. The proposed converter circuit consists of four cascaded MOSFET power switches with three clamping diodes and four voltage sources (voltage cells) connected in series. The main objective of the new topology is to reduce current ripples and torque ripples that are associated with hard switching of the traditional chopper circuit. When the voltage profile of this converter is applied on a DC motor, it positively affects the performance of the DC motor armature current and the generated dynamic torque. Moreover, it has been shown that the operation of the DC motor with the newly proposed chopper topology greatly decreases the motor armature current ripples and torque ripples by a factor equal to the number of the connected voltage cells.

Keywords: *Multilevel DC/DC Converter, Traditional Converters, DC Drives.*

ISBN: 978-81-948785-3-7

VEHICLE TRACKING SYSTEM

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Abstract

This project presents a vehicle tracking system that can be remotely monitored by a GSM phone. It is designed to track the position of a vehicle at any period of time. It comprises of a GPS receiver, a microcontroller and a GSM module. The combination of these technologies produces a tracking system. The GPS continuously takes input data from the satellite and stores the latitude and longitude values in a ATmega328P microcontroller. This basically means that if a person has to track a vehicle, a message has to be sent to a GSM device, by which it gets activated. The location of the vehicle is identified using global positioning system (GPS) and global system for mobile communication (GSM). These systems constantly watch a moving vehicle and report the status on demand. When theft is identified, the owner sends an SMS to the microcontroller and the microcontroller sends back a message containing the location of the vehicle in terms of latitude, longitude and time.

***Key Words*:** Vehicle tracking security, GSM, GPS, SMS, microcontroller.

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ALCOHOL DETECTION WITH MESSAGING SYSTEM AND VEHICLE CONTROL

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Abstract

The motive of this project is that the alcohol is detected by the alcohol sensor MQ3 which is the senses in the car while in case the driver drinks alcohol, and the sensor sends a signal to Arduino Uno which forward a particular signal to the GSM. The GSM sends a message to a particular preregister mobile that the driver is drunken and the buzzer beeping and led is indicated red and then the engine will be locked. If any other person wants to drive the system will be unlocked after certain or given time but alcohol sensor continues working. In this way owner get the real location by receiving the exact position of the car. It will be copied to the google map and the location of that car and easily be accessed.

Key Words**:** *Vehicle tracking security, GPS, GSM, SMS, Arduino Uno***.**

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VEHICLE-TO-GRID TECHNOLOGY IN A MICRO-GRID USING DC FAST CHARGING ARCHITECTURE

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Abstract

A vehicle is propelled with electric motors and draw power from on board electric source is an electric vehicle. For storing the electric energy, most common storage device used in electric vehicle is battery. Electric Vehicle (EV) batteries can be utilized as potential energy storage devices in micro-grids. They can help in micro-grid energy management by storing energy when there is surplus (Grid-To-Vehicle, G2V) and supplying energy back to the grid (Vehicle-To-Grid, V2G) when there is demand for it. Proper infrastructure and control systems have to be developed in order to realize this concept. Architecture for implementing a V2G-G2V system in a micro-grid using level-3 fast charging of EVs is presented in this paper. A micro-grid test system is modeled which has a dc fast charging station for interfacing the EVs. Simulation studies are carried out to demonstrate V2G-G2V power transfer. Test results show active power regulation in the micro-grid by EV batteries through G2V-V2G modes of operation. The charging station design ensures minimal harmonic distortion of grid injected current and the controller gives good dynamic performance in terms of dc bus voltage stability .to get emission less power from source to load and load to source in economical way power generation V2G take place

Keywords - *DC fast charging, Electric vehicle, Grid connected inverter, Micro-grid, Off-board charger, Vehicle-to-grid.*

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POWER FACTOR CORRECTION AND POWER QUALITY IMPROVEMENT IN BLDC MOTOR DRIVE USING SPEIC CONVERTER

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Abstract

Power factor correction and power quality (PQ) improvement based BLDC motor drive proposed. Normally the permanent magnet BLDC motor drive connected with the diode bridge rectifier and high value of the capacitor due to which poor power factor and higher THD (Total harmonic distortion) value at the input side To overcome this difficulty SEPIC (Single-ended primary inductance converter) converter use to optimize the PF and THD value. The converter operates in discontinuous conduction mode to get the desired result. This scheme also used for speed control of BLDC motor by controlling the VSI (voltage source inverter) feeding the BLDC drive.

Keywords – *BLDC motor, Diode bridge rectifier, SEPIC Converter, Voltage source inverter, Hall sensor, PWM Generator, PI Controller, MATLAB Software.*

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CONSTANT CURRENT FUZZY LOGIC CONTROLLER FOR GRID CONNECTED ELECTRICAL VEHICLE CHARGING

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Abstract

In recent years the source of clean energy is high in demand. This can be attained to an extend by using electric Vehicle. The development for the cause of an electric vehicle is air pollution that is being caused by motor vehicles. The main problem with an EV is long time for its charging. The vehicle should be charged in an electronic charging station as fast as the motor vehicle is being filled with fuel. Therefore, there is a definite need for the reduction of charging time in EVs. Constant current charging of EV can help to solve this problem. That's why, the role of DC-DC converter is very important. DC-DC converters are commonly utilized in electronic devices such as mobile phones, computers etc. This paper presents the possibility of grid connected constant current charging of EV with buck DC-DC converter through fuzzy logic control (FLC). The electronic charging station must be able to provide charging of different electric vehicles with different capacities in less duration. This paper provides the information about fast charging of an electric vehicle developed in MATLAB. The optimal performance of the circuit is represented with the help of simulation.

Keywords: *Electric vehicle EV, Electronic charging stationECS, Buck-Boost converter, FLC.*

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OPTIMAL CONTROL OF AN UPQC TO ASSURE POWER QUALITY IN ELECTRIC DISTRIBUTION GRIDS

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Abstract

Electrical energy is the most famous form of energy and we are massively relying on it. The growing use of new technologies as electric vehicles and renewable energy sources (loads and generators with high nonlinear content), cause a deterioration in the voltage and current signals in the grid. The sensitive loads are significantly affected by these problems. In this way, a Unified Power Quality Conditioner (UPQC) with a Linear Quadratic Regulator optimal control is proposed with the incorporation of an internal model of sinusoidal signals. The objective is to compensate harmonic distortion and to guarantee correct RMS amplitude values for the load voltage and the grid current, at the same time, providing Power Factor correction. The proposed system attenuates the harmonic distortion of both signals with a THD lower than 5% on nonlinear loads with high power consumption. Additionally, the system reaches an effective compensation of sags and swells of long and short duration.

Keywords— *Power Quality, THD, UPQC, LQR, Active Power Filters, PI Controller.*

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FOUR QUADRANT OPERATION & CONTROL OF THREE-PHASE BRUSHLESS DC MOTOR FOR ELECTRIC VEHICLES

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Abstract

With the assistance of a bidirectional dc-dc converter, the paper shows how to control the four quadrant operation of a brushless direct current motor. The voltage source inverter (VSI) receives the DC-DC converter's output and drives the motor. During driving mode, the battery's bi-directional converter performs the buck operation. During regenerative mode, the motor behaves as a generator and the electrical energy gets archived in the battery by the boost operation. When the electric vehicles often start and stop, the scheme offers regenerative braking to recover energy for each stopping event. The regulated speed on the slope also gives energy return to the battery when the electric vehicle (EV) is driving down the hill (slope). The above mentioned- procedures are verified using MATLAB (Simulink) software.

Keywords - *Voltage Source Inverter [VSI], Electric vehicle (EV), Brushless DC motor (BLDC), Pulse Width Modulator (PWM), MOSFET, PID, Proportional integral (PI).*

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FAST DC-TYPE ELECTRIC VEHICLE CHARGER BASED ON A QUASI-DIRECT BOOST - BUCK RECTIFIER

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Abstract

This work presents a DC-type fast electric vehicle battery charger featuring low switching losses. Herein, a conventional three-phase two-level voltage source rectifier with low capacitive energy storage operates with a discontinuous PWM modulation where each phase-legs stops switching for 240o of the grid fundamental period, i.e. only a single phase-leg switch every 60o. In this case, this AC-DC converter loses voltage controllability of the DC-link and thus a buck-type DC-DC converter is cascaded in order to provide the necessary voltage regulation and current limitation for the charging process of the electric vehicle. The presented circuit is benchmarked against other solutions for a designed 50 kW power capability battery charger when considering the charging of a 30 kWh Nissan Leaf. The results show a superior power efficiency of the studied system.

Keywords—*Electric Vehicle, Fast Charger, Rectifier.*

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MODELLING AND CONTROL OF BIDIRECTIONAL BUCK-BOOST CONVERTER FOR ELECTRIC VEHICLES APPLICATIONS

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Abstract

The present paper study modelling, design consideration and control of a bidirectional DC/DC buck-boost converter for application in hybrid and electric vehicles. The proposed model includes electric motor, dynamics of the vehicle and theirs control. A mathematical model of the DC/DC buckboost converter is described with differential equations during the both the boost and buck regions of operation. The control system is created and realized with proportional-integral regulator. The proposed solution is realized in visual environment MATLAB/Simulink. The obtained results demonstrates that the proposed solution is suitable for different electric vehicles applications.

Keywords — *Bidirectional DC/DC converters, Control, Electric and hybrid vehicles, Modelling.*

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A NOVEL EFFICIENT VEHICLE FAST CHARGING SYSTEM STRUCTURE WITH LOWER ORDER CURRENT SUPPRESSION CAPABILITY

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Abstract

Aiming at improving the efficiency of the traditional electric vehicle (EV) fast chargers with two-stage structure, this paper comes up with a novel charger with single-stage structure, where the turn ratio of the transformer is specially designed to obtain a lower input line-to-line voltage (190V) for the single AC/DC converter. Followed by a fair comparison method, the power losses of transformers and converters in both two-stage and single-stage structures are analyzed. The better performances of the single-stage structure, which includes lower costs and higher power conversion efficiency (up to 2%), are approved by the results of calculation and simulation. To suppress the harmonic current getting into the battery packs in the single-stage structure, a small capacity bidirectional half bridge DC/DC converter is designed to function as a DC active power filter (DCAPF) to compensate the harmonics. Finally, both simulation and experimental results are carried out to validate the low order harmonic current compensation effect.

Key Words: *(EV) fast chargers, AC/DC converter, DC active power filter (DCAPF)*

ISBN: 978-81-948785-3-7

DESIGN AND ANALYSIS OF BI-DIRECTIONAL DC-DC DRIVER FOR ELECTRIC VEHICLES

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Abstract

Batteries are the primary energy-storage devices in ground vehicles. Nowadays battery fed electric drives are commonly being used for electric vehicles applications, due to various advantages, such as: nearly zero emission, guaranteed load leveling, good transient operation and energy recovery during braking operation. To fulfill these requirements converters with bidirectional power flow capabilities are required to connect the accumulator (battery) to the dc link of the motor drive system. Battery fed electric vehicles (BFEVs) is required to function in three different modes namely: acceleration mode, normal (steady state) mode and braking (regenerative) mode. During acceleration and normal modes, the power flow is from battery to motor whereas during braking or regenerative mode the kinetic energy of the motor is converted into electrical energy and fed back to battery. The DC-DC converter is required to perform mainly two functions: first to match the battery voltage to the motor rated voltage and second to control the power flow under steady-state and transient conditions, so that the drive performance is as per the requirement. In the present work closed loop operation of bi-directional dc-dc converter feeding a dc motor and its energy recovery due to regenerative braking has been demonstrated. MATLAB Simulation is used to present the output.

Keywords: *Electric vehicle EV, Buck-Boost converter*

ISBN: 978-81-948785-3-7

ENERGY MANAGEMENT STRATEGY OF A PHOTOVOLTAIC ELECTRIC VEHICLE CHARGING STATION

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Abstract

The adoption of the photovoltaic electric vehicle charging stations has been on the rise. In this paper, a grid connected electric vehicle charging station powered a by photovoltaic solar system and a pack of batteries as storage system, is evaluated and analyzed. The most important parameter for supervising the system is the direct current bus voltage. The grid or the energy storage system can supply the electric vehicle charging station to maintain the bus voltage at its level. This supervision is tested by simulating the charging system under different irradiance conditions taking into account the cost of the energy transmission and the state of charge of the battery. The results validate the performance of the proposed energy management and the proper operation of electric vehicle charging station .

Keywords: *Electric vehicle, charging station, photovoltaic, Management*

ISBN: 978-81-948785-3-7

SMART GRID POWER QUALITY IMPROVEMENT USING MODIFIED UPQC

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Abstract

The Smart Grid system typically deals with different issues involving security and Power Quality (PQ) improvement. With massive usage of power electronic devices and growth of nonlinear loads, harmonics are inserted into the system. So, it is important to maintain the quality of the power for the efficient functioning of the end user equipment. The well-known Flexible AC Transmission System (FACTS) devices like Unified Power Quality Conditioners (UPQC) are usually employed to resolve the issues related to voltage sag, swell, flicker, PQ, and neutral current reduction of distribution systems. UPQC is a custom powered device which is considered as the grouping of DVR and D-STATCOM which performs series, shunt compensating and phase shifting at the same time. An UPQC itself inserts harmonics into the system that affects the system stability for sensitive loads. This paper describes biogeography-based optimization (BBO) with harmonics elimination techniques for modified UPQC connected with Smart Grid. At fault condition UPQC mitigate the fault with simultaneous or individual operation of series-shunt converters. The excitation of Modified UPQC converters with DC link capacitor are obtained from PV (Photo-Voltaic) panel.

Keywords: *UPQC, DSTATCOM, DVR, PV panel, Power Quality.*

ISBN: 978-81-948785-3-7

STABILITY ANALYSIS OF A DC DISTRIBUTION SYSTEM FOR POWER SYSTEM INTEGRATION OF PLUG-IN ELECTRIC VEHICLES

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Abstract

This project proposes a method for enhancing the stability of a dc distribution system that integrates plug-in hybrid electric vehicles (PHEVs) with an ac power grid. The dc distribution system is interfaced with the host ac grid via a voltage-sourced converter and can also embed photovoltaic (PV) modules. Thus, bidirectional dc–dc electronic power converters act as battery chargers and interface the PHEVs with the dc distribution system, while DC Link modules are interfaced with the dc distribution system via unidirectional dc–dc converters. The dc distribution system is expected to be more efficient and economical than a system of ac–dc battery chargers directly interfaced with an ac grid, but it is prone to instabilities due to the constant-power property of the dc–dc converters. Using a nonlinear control strategy, the proposed stability enhancement method mitigates the issue of instability by altering the power set points of the battery chargers, bidirectional dc–dc converters, without a need for changing system. The project presents mathematical models for the original and modified systems and demonstrates that the proposed technique expands the stable operating region of the dc distribution system.

Keywords— *PHEVS, Bidirectional DC-DC converters, PV modules (Photovoltaic).*

ISBN: 978-81-948785-3-7

SIMULATION OF SOLAR PV ARRAY USING HYBRID MAXIMUM POWER POINT TRACKING TECHNIQUE

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Abstract

This paper introduces a hybrid maximum power point tracking (MPPT) technique for photovoltaic (PV) arrays working under partial shading conditions. This new algorithm can combine a traditional MPPT algorithm, such as perturb and observe, or incremental conductance, with the artificial neural network (ANN) technique. The proposed hybrid MPPT algorithm is based on the ANN and used to predict the global MPP region by estimating its voltage boundaries. Consequently, the conventional MPPT algorithm searches for the MPP in the predicted region. The proposed technique is modelled and simulate during MATLAB/Simulink. The results show the effectiveness of the proposed hybrid MPPT technique to track the global MPP accurately with a rapid response comparing to the ANN; this increases the output power level of the PV array under various shading patterns.

Keywords:.*Maximum Power Point Tracking(MPPT), Artificial neural network(ANN), Partial shading conditions(PSC), Perturbation& observation(P&O), Photovoltaic(PV)*

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ON-BOARD BIDIRECTIONAL BATTERY CHARGERS TOPOLOGIES FOR PLUG-IN HYBRID ELECTRIC VEHICLES

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Abstract

Over the last years, Electric Vehicles (EV) have gained a growing interest as an alternative option for Internal Combustion Engine driven vehicles due to the increasing concern of global warming issue. Since the battery is the key component in the development of electric vehicles technology, the battery charger is also indispensable for their emergence. Typically battery chargers are composed of two stages of conversion and they can be implemented inside (on-board) or outside (off-board) the vehicle. The on-board chargers are limited by size and weight thus they are restricted to low power (slow charging). So to achieve high power level (fast charging) several integration solutions with the existent drivetrain in the vehicle have been proposed. Battery chargers can support bidirectional power flow between the vehicle and the grid which introduces "Vehicle-to-Grid" technology. This paper presents an overview of on-board bidirectional battery chargers. Different topologies for both two stage chargers and integrated chargers are reported and their operation principals are explained.

Keywords— *Plug-in Hybrid Electric Vehicles, integrated battery charger, on-board charger, fast charging, bidirectional converters.*

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