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Special Issue

Sulfated zirconia: a novel super acid catalyst for the synthesis of homoallylic alcohols

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Abstract

A new catalytic allylation of aldehydes has been developed using solid super acid, sulfated zirconia as a heterogenous catalyst to produce homoallyllic alcohols in high yields. A high range of aromatic, aliphatic and heterocyclic aldehydes are efficiently converted into homoallyllic alcohols under the catalytic influence of sulfated zirconia (5 mol%) in acetonitrile at room temperature. The catalyst can be easily recovered by filtration and reused for further cycles with a gradual decrease in activity.

Key Words:Allylation, aldehydes, allyltin, solid superacid, sulfated zirconia, homoallylic alcohols.

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IMPACT OF FOREIGN TRADE ON INDIAN ECONOMY – A STUDY

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Abstract *This paper evaluates the trend pattern of India's Foreign Trade during the pre- and post-liberalization periods. Further, the study is mainly based on the secondary data collected from published sources. To study the impact of the foreign trade, data relating to the Gross Domestic Product (GDP), one of the most important economic indicators, has been collected for the period of 54 years that include pre- and post-liberalization periods. For analysis, statistical tools like multiple regression method, ANOVA, and Durbin Waston autocorrelation tests are applied. The results revealed that country's foreign trade increased consistently during pre- and post-liberalization periods, but it increased more during the post-liberalization period compared to pre-liberalization period. During the study period, the growth rate of imports was more than the growth rate of exports. This led to deficit in the balance of payment of the country. The volume of trade and GDP has been increasing year by year. A positive and increasing trend during the period of study has also been observed.*

Keywords: *Foreign Trade, Exports, Imports, Economic Development, Foreign Trade Policy*

INTRODUCTION

Prior to the independence, British rulers followed typical colonial trade, i.e., exported the raw materials to British country and imported the manufactured goods. Because of this practice, the local-made handicrafts were adversely affected and highly suffered. British rulers did not encourage the industrialization in the country. This practice was changed after independence. India opted for the mixed economy system, due to which public and private sectors have coexisted in the economy after independence 1947 with major objectives of rapid economic growth, self-reliance, social justice, etc. *The Government of India heavily depended on imports to develop and maintain the productivity in the country. For this, the country imported required machineries, food grains. Higher imports led to greater pressure on the balance of payment (BoP) and economy.* During the first and second five-year plans, the government had given high importance to the self-reliance and maintained rigid trade policy. However, foreign trade was committed to fast economic development as it makes an increasingly significant contribution to economic growth and substantially to the economic welfare of the people of the country.

The foreign trade of a nation includes in-and-out movement of goods and services from one country to another. The foreign trade results in the flow of foreign exchange, which leads to faster economic development and increases leaving standard of people of the country. In general, no country in the world possesses all the resources to produce all required goods and services that it needs and thus no country is self-reliant in the world. This necessitates the trade to exchange goods and services with the other countries. Economies of scale, comparative costs of production of goods and services, specialization, and progress of science and technology also influence the importance of the foreign trade. Foreign trade is also required to meet needs of the growing population in the developing countries. Foreign trade, as engine for economic growth, makes substantial contribution to the nation's development by earning foreign exchange. Now, all countries are considering foreign trade as a development strategy and an effectual tool for economic growth and generation of employment.

REVIEW OF LITERATURE

Eminent academicians, research scholars, management practitioners, and administrators have studied foreign trade trends in Indian economy earlier. It is relevant to refer briefly to the previous studies to find out and fill up the research gaps. The following are some of the previous research studies conducted in this area.

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A Novel Approach to Construct Flexible Pavements

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ABSTRACT *This paper aims at formulating a novel approach to design flexible pavements. The study of design data such as California Bearing Ratio (CBR) value, traffic data, drainage conditions, rainfall data, topography of the area etc. are considered. It is based on the design calculation by Indian road congress (IRC) codes.*
Construction aspects include usage of various materials, machines and manpower. Quality assurance (QA) and Quality control (QC) for various materials are incorporated in the construction procedure.
The construction of flexible pavement include several activities like excavation, embankment, sub-grade construction, granular sub base, wet mix macadam, prime coat, dense bituminous macadam and bituminous concrete.

Keywords: *California Bearing Ratio, Construction of Flexible Pavement.*

1. Introduction

Flexible pavements are those which have low or negligible flexural strength and are rather flexible in their structural action under application load. The flexible pavement layers may reflect non-recoverable as well as recoverable deformations of the layers including the sub grade on to the upper layers and also on the pavement surface. Thus if the lower layer of the pavement or soil sub grade gets deformed or undulated due to permanent deformation, the flexible pavement layers and also the pavement surface may get undulated in a similar pattern.

The vertical compressive stress is maximum on the pavement surface directly under the wheel load and it's equal to the contact pressure under the wheel. Due to the ability of flexible pavement layers to distribute the compressive stresses to a larger area in the shape of a truncated cone, the compressive stresses get decreased at the lower layers. Therefore by taking advantage of the stress distribution characteristics of the flexible pavement layers, the 'pavement layer system concept' was developed. According to this, the flexible pavement may be constructed consisting of a number of layers and the top layer has to be the strongest as the highest compressive stresses are to be sustained by this layer, in addition to the wear and tear due to the moving traffic and due to varying factors because of weather.

Lower layers of the pavement have to take up only lesser magnitudes of stresses and there is no direct wearing action due to traffic loads and is due to environmental factors. Therefore inferior materials with lower cost can be used in the lower layers. The lowest layer consists of selected soil which is compacted to the required thickness and density which is called the 'sub grade' and is laid on the prepared or compacted local soil or fill.

The flexible pavement structure is usually designed for a life of 15 years or more, but will need re-surfacing or strengthening layers to be laid periodically on the surface depending on the functional and structural deterioration caused due to the combined effect of traffic and weather.

2. Literature Review

For laying pavements studies for maps, reconnaissance and traffic which fall into the category of Engineering surveys have to be made.

2.1 Map Study

Topographic maps (from the Survey of India) are available with contour interval of 15 to 30 meters. Mostly rivers, hills, valleys are shown in the map. By studying these maps it can be inferred that several possible routes can be interconnected. Alignment should be avoided whenever valleys, ponds or lakes are encountered. Approximate location of bridge which the cross river should be maintained at short distance for economy, avoid bending of the river [1]. This study gives a rough guidance of the routes to be further surveyed in the field.

Performance Evaluation of Bitumen to Re-use in Flexible Pavement Construction

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Abstract:- Bituminous is a composite material mostly used in construction project like road surfacing, airports, parking's lots etc. It consists of asphalt or bitumen {used as binders} and minerals mixed together and laid down in compacted.
Now a days, the steady increment in high traffic intensity in terms of commercial vehicle's and the significant variation in daily and seasonal temperature put us in a demanding situation to think of some alternative for the improvements of the pavements characteristic's and quality by supplying some necessary modifications which shall satisfy both the strength as well as economic aspects . So we can see, where ever a road is under reconstruction the previous structure of the road (bitumen) is wasted in many circumstances. Therefore we are going to use that bitumen for checking whether it can be reused or not with performance evaluation.

Keywords: composite material, modification of bitumen, performance evaluation, resuse.

I. INTRODUCTION

Bitumen is a mixture of Organic Liquids that are highly Viscous, Black, Sticky, Entirely Soluble in Carbon Disulfide, and composed primarily of highly condensed Polycyclic Aromatic Hydrocarbons.

Naturally occurring or crude bitumen is a sticky, tar-like form of petroleum which is so thick and heavy that it must be heated or diluted before it will flow. At room temperature, it is much like cold molasses. Refined Bitumen is the residual (bottom) fraction obtained by fractional distillation of crude oil. It is the heaviest fraction and the one with the highest boiling point, boiling at 525 °C (977 °F).

Bitumen is a petroleum product obtained by the distillation of petroleum crude. Coal tar is produced from the coal as the byproduct of coke. Both bitumen and tar have similar appearance as both are black in colour. Though both these binders were used for pavement works, they have widely different characteristics. Tar is no longer used for paving applications because of its undesirable characteristics including high temperature susceptibility and harmful effects of its fumes during heating.

The terms asphalt and bitumen are often used interchangeably to mean both natural and manufactured forms of the substance. In American English, asphalt (or asphalt cement) is the carefully refined residue from the distillation process of selected crude oils. Outside the United States, the product is often called bitumen. Geologists often prefer the term bitumen.

II.LITERATURE REVIEW

Holtz, K., and Eighmy(2000), In the highway infrastructure, a large number of originates materials and technologies have been invented to determine their suitability for the design, construction and maintenance of the pavements.The use of these materials as a road construction proves eco-friendly economical and use of plastic gives strength in the sub-base course of the pavement.the recycing of bitumen nd reuse also plays important role to decrease the polution and alson wastage.

Dr.R.Vasudevan,(2010) Stated that the polymer bitumen blend is a better binder compared to plain bitumen. Blend has increased softening point and decreased Penetration value with a suitable ductility. When it used for road construction it can withstand higher temperature and load. The coating of plastics reduces the porosity,

Design of Traffic Rotary at Forest Complex, Karimnagar, TS

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Design of Traffic Rotary at Forest Complex, Karimnagar, TS

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ABSTRACT

Design of traffic rotary is an enlarged road intersection. This includes traffic volume, rotary capacity, design speed. Rotary intersection designed to decrease traffic time, delay, severity of accidents and cost. The vehicles entering into the rotary are forced to move in a clockwise direction. Traffic volume study plays an important role in the evaluation of requirement of the rotary junction. For the analysis of the traffic volume, traffic has to be conducted in the peak hours at a rotary junction.

Keyword : Traffic Time, Traffic Rotary, Rotary Intersection, Weaving Man Oeuvre, Passenger Car Units

I. INTRODUCTION

Rotary Intersection

A rotary intersection or traffic rotary is an enlarged road intersection where all converging vehicles are forced to move round a large central island in one direction before they can weave out of traffic flow into their respective directions radiating from central island .

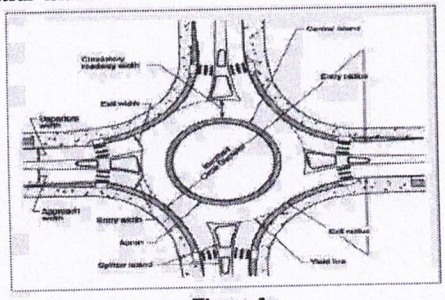

Figure 1

In India and other countries which follow 'keep to the left ' regulation, clock-wise direction of flow around the island is followed. The main objects of providing a rotary are to eliminate the necessity of stopping even for crossing streams of vehicles and to reduce the area of conflict.

The crossing of vehicles is avoided by allowing all vehicles to merge into streams around the rotary and then to diverge out to the desired radiating road. Thus the crossing conflict is eliminated and converted into 'weaving man oeuvre' which consists of (i) merging man oeuvre form the left and diverging to the right or (ii) a merging from the right and diverging out to the left

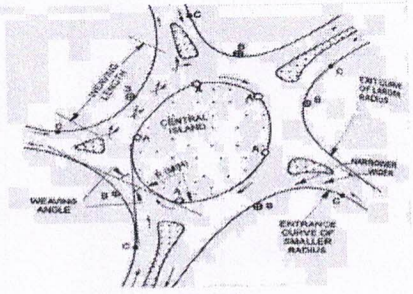

Figure 2

Traffic Operations in a Rotary:

Merging:

When a vehicle travelling along an adjoining lane or roadway desires to enter the main traffic stream by looking for an opportunity of sufficient gap between the vehicles of the main stream, this operation is called 'merging manoever'.

Diverging:

When a vehicle travelling along the main traffic stream opts to diverge or move out of this stream to an

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Behavior and Comparison of High Strength Concrete (M45) Using Super Plasticizers (SP 430) As Admixture

M. ShivaRamaKrishna, Koudagani Venkatesh, Banoth Yakub, E Malathi

Abstract

The Aim of this paper is to study the High Strent gh Concrete of mix design M45 with P.P.C, O.P.C and compare the Mechanical Properties. Admixures have been used for generating High Strength Concrete and optimum dosage. Comparative studies of High Strentgh Concrete using P.P.C, O.P.C and by using 0.5%, and 1% of Super Plasticizer (S.P 430) with O.P.C.

Keywords

High Strength Concrete, Mechanical Properties, Super Plasticizer-430, PPC,OPC

Full Text:

PDF

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A HYBRID DIESEL-WIND-PV-BASED ENERGY GENERATION SYSTEM WITH BRUSHLESS GENERATORS

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October 12, 2018

Abstract

This paper presents an experimental implementation of a standalone micro grid topology based on a single voltage source converter (VSC) and brushless generators. The micro grid system is energised with different renewable energy sources namely wind and solar PV array. However, a diesel generator (DG) set and a battery energy storage system (BESS) are also used to maintain the reliability of the system. The proposed topology has the advantage of reduced switching devices and simple control. The implemented topology has DG set as an ac source. The wind generator and the solar PV array are dc sources which are connected to the dc link of the VSC. The BESS is also used at the dc link to facilitate the instantaneous power balance under dynamic conditions. Along with the system integration, the VSC also has the capability to mitigate the power quality problems such as harmonic currents, load balancing, and voltage regulation. A wide variety of test results are presented to demonstrate all the features of the proposed system.

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IMPROVEMENT OF POWER TRANSFER CAPABILITY OF HVDC TRANSMISSION SYSTEM USING ARTIFICIAL NEURAL NETWORK (ANN) CONTROLLER.

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Abstract

Strides in Industrial Power System demands increased electrical energy consumption. With the increase in size and intricacies of power system, appropriate control strategy need be developed to ensure power delivery with minimum loss, which also is economical, reliable and with in technical limits. Transport of major capacity of power through long distances require higher levels of generation with efficient power transmission and should address the problems associated with long AC large capacity power transmission. To ensure safety of AC-DC system, strict monitoring of system signals, rapid classification of perturbations, supplement the making of a protective control decision. HVDC systems necessitate decisive actions in micro to millisecs range. Optimal operations of the systems depend on knowledge and fast

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Special Issue

Free Particle Movements Simulation in a 1-ϕ Gas Insulated Bus duct Using Dielectric Coating

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Abstract

The image charge effect on the Particle motion inside a Gas Insulated Bus duct (GIB) of single phase using epoxy resin coating of dielectric on the inner surface of GIB outer enclosure is presented in this paper. Taking into account many forces like drag, gravitational and the electrostatic acting on the free conducting particle, a mathematical model was derived. The differential equation of second order for the motion of the particle is solved and restitution coefficient was considered at each impact of particle with the GIB enclosure . At the particle locations, computation of electric fields instantaneously was made using the Charge Simulation Method (CSM). The motion of the metallic particle in the absence of image charge effect are compared with in the

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Special Issue

Simulation Of Isolated Boost Converters

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Abstract

In this paper two implementations of the isolated boost converter that exhibit no parasitic voltage ringing across all semiconductor devices on the primary and secondary sides of the transformer are introduced. Ringing-free operation is achieved by clamping the voltages of the primary switches and rectifiers to the voltage of the primary-side energy-storage capacitor and clamping the voltage across the secondary-side rectifiers to the output filter capacitor.The performance of the proposed topology was successfully verified by using MATLAB simulation.

1 Introduction

The conventional nonisolated boost converter topology has been extensively used in various acdc and dcdc applications. In fact, the front end of todays acdc power supplies with power-factor correction (PFC) is almost exclusively implemented with the boost topology. The boost topology is also used in numerous battery-powered applications to generate a high output voltage from a relatively low

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Real Power Tracing and Estimation in Deregulated Environment using Big Data Analytics

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Abstract

The tracing of real power is very much difficult in deregulated environment due to unbundle rules and increasing number of market players. In this paper for real power tracing in deregulated environment two methods are proposed, known as RED method, CAF method are demonstrated on IEEE-39 bus system using big data analysis to calculate load shearing of generators(optimal generation schedule) for forecasting of future power system for system planning. The big data analysis brought revolutionary changes in data analytics in different engineering fields one of them is power system analysis. The effectiveness of these two methods for tracing of real power has been demonstrated using big data analysis using Hadoop tools.

Key Words:: Current Adjustment Factor (CAF) method, hadoop map reducer, Real power tracing, Relative Electrical Distance method (RED).

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A HYBRID DIESEL-WIND-PV-BASED ENERGY GENERATION SYSTEM WITH BRUSHLESS GENERATORS

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October 12, 2018

Abstract

This paper presents an experimental implementation of a standalone micro grid topology based on a single voltage source converter (VSC) and brushless generators. The micro grid system is energised with different renewable energy sources namely wind and solar PV array. However, a diesel generator (DG) set and a battery energy storage system (BESS) are also used to maintain the reliability of the system. The proposed topology has the advantage of reduced switching devices and simple control. The implemented topology has DG set as an ac source. The wind generator and the solar PV array are dc sources which are connected to the dc link of the VSC. The BESS is also used at the dc link to facilitate the instantaneous power balance under dynamic conditions. Along with the system integration, the VSC also has the capability to mitigate the power quality problems such as harmonic currents, load balancing, and voltage regulation. A wide variety of test results are presented to demonstrate all the features of the proposed system.

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PERFORMANCE INVESTIGATION OF FRACTIONAL-ORDER PI BASED UNIFIED POWER QUALITY CONDITIONER

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October 12, 2018

Abstract

To improve power quality parameters of distribution system consisting of nonlinear loads, a UPQC (Unified Power Quality Conditioner) is introduced. This UPQC shall address well known power quality issues. In this proposed work to make the performance of UPQC more roust by introducing novel control strategy known as Fractional Order PI (FOPI) controller. The performance of FOPI based UPQC demonstrated over PI based UPQC.

***Index Terms*:** Unified Power Quality Conditioner (UPQC), power quality (PQ), proportional integral (PI), fractional order PI (FOPI), voltage source inverter (VSI), Active Power filter (APF).

A Novel Pulse Width Modulation Scheme for T-Type Multi-level Inverter

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Abstract: In recent times, abbreviated switch calculates multilevel inverter (RSC-MLI) has become an regressing area of inquiry in power electronic converters. To ascendance these RSC-MLI topologies, different novel modulation connives are reported. Multi reference is one such changes scheme covered for different RSC topologies, such as T-type. Even so, the performance of this old scheme results in high total harmonic distortion (THD) in line voltages, when equated with the conventional level shifted pulse-width modulation planes. This observation is now in this study and the reason for its degraded THD performance has been intensely discussed. To appease this question, a modified multi-reference dual-carrier modulation technique with multiple references and two carriers is intended. To carry out this proposed modulation methods, an alternate carrier and modulation signals arrangement with various carriers and single reference is also awarded. Finally, a relative THD performance of the given and conventional modulation methods is carried out on a five-level T-type MLI and found simulation results are corroborated experimentally.

***IndexTerms*– THD, RSC_MLI, T-Type.**

I. INTRODUCTION

Multilevel inverters (MLIs) use the concept of addition of small multiple voltage levels and possess various advantages like reduction in d*v*/d*t*, electro-magnetic interference and total harmonic distortion (THD) [1, 2]. In literature, cascaded H-bridge (CHB), diode clamped and flying capacitor are the widely accepted classical MLI topologies, and are reported with various modulation strategies, such as sinusoidal pulse-width modulation (SPWM), selective harmonic elimination (SHE), third harmonic injection and space vector modulation (SVM) [3–8]. Among these conventional schemes, SPWM is very popular due to its easiness in implementation and is further classified into level shifted pulse width modulation (LSPWM) and phase shifted pulse-width modulation (PSPWM) [9]. LSPWM is sub-classified into in phase disposition (IPD), opposite phase disposition (OPD) and alternate phase disposition (APD). It is well reported that LSPWM-IPD results in better line THD performance compared with LSPWMOPD, LSPWM-APD and PSPWM [9].

In practice, MLIs are limited to lower levels, because of its increased switch count at higher levels. This increase in switch count not only turns the topology complex but also raises its overall cost. Form past two decades, there is an extreme exploration carried out to evolve newer topologies with reduced switch count (RSC). T-type is one of the recently reported RSCMLI, which gathered much attention. T-type possesses most feasible and generalised configuration with 37.5% reduction in switch count compared with classical topologies [10–12]. Extreme reduction in switch count of RSC-MLI's created diversified effects on switching states such that, most popular conventional SPWM schemes are insufficient to implement them [13, 14]. In literature, few of such RSC configurations are reported with SHE and SVM methods. However, these schemes involve complex mathematical calculations, which turn more complicated at higher levels [15].

Recently, few RSC topologies are reported with multi-carrier modulation schemes involving logical expressions. However, these logical expressions are not generalised, and vary with variation in number of levels and topological arrangement [15]. A novel multi reference modulation scheme for T-type MLI is reported, and a seven-level T-type with multi-reference modulation for grid connected systems is reported in [16, 17]. This scheme is accepted widely, due to its generalized nature which can be applicable to any RSC configuration [18–21]. However, this scheme suffers from high THD in line voltages when compared with the conventional PWM scheme. In [22], a phase shifted multi-reference The modulation scheme is reported for cascaded T-type topologies. In this method, the number of carriers is equal to the number of modules that are connected in cascade and moreover, when considering a single module its performance is identical to a conventional multi-reference modulation scheme. From the keen literature review of various multi-reference and

Multi-carrier modulation schemes reported for multiple RSC-MLI topologies, it is observed that most of these schemes either result in high THD in line voltages or suffers from the generalization of switching scheme at higher levels. This observation is clearly discussed in this paper and simple generalized modulation schemes are proposed, which obtain satisfactory line voltage THD performance on any RSC-MLI topology.

The structure of the proposal is as follows. In Section 2, performance of conventional multi-reference modulation scheme on a five-level T-type MLI is discussed and the reason for its poor THD performance is analysed. In Section 3, modifications in the

Traditional multi-reference modulation scheme to improve its THD performance are suggested and a modified multi-reference the dual-carrier modulation scheme is proposed. Also, to implement the proposed project an alternative carrier and modulating signal arrangement is presented and generalization of this scheme to higher levels is discussed with the help of a Flowchart. Performance of the proposed system is investigated on a five-level T-type topology and they're superior harmonic performance

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A Family Of Excessive Capacity Gain Unique Component Mule Switched Capacitor Percent Rectifiers

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ABSTRACT

In this paper your three-layered multi-level proposition is proposed utilizing a half and half switch capacitor idea. The converter is appropriate for high voltage pick up applications from conventional three-stage low voltage sources. The three-level voltage process decreases the weight and greater part of the attractive gadgets. The primary favorable circumstances of the proposed transformer are: low number of dynamic switches, high voltage increment, sinus streams, low voltage worry over all parts and basic control. Both static and dynamic examination are explored. The trial comes about for the 7500 W/220 V-to-1600V lab show are shown with most extreme proficiency of 97.78% and examined requiring high voltage pick up converters regularly revealed in expert writing.

I INTRODUCTION

These applications include lasers, radars, X-Ray and other medical equipments [1]–[3]. In these cases the power flow is unidirectional and the conventional grid is the main source, being the load supplied through a high dc-link voltage. Because of this, a high voltage ac-dc power conversion is necessary. For low power levels single-phase voltage multiplier circuits are often employed due to robustness and simple operation.With the increase of the power load the use of threephase converters become necessary. However, it should be provided mechanisms to reduce the voltage stress across the components and increase the ac current quality. In [3] a three-phase symmetrical multistage voltage multiplier has been presented. This converter merges three voltage multiplier cells connected to isolated three-phase voltage source to achieve high gain conversion. It has the advantage that all semiconductors are subjected to low voltage, which allows the operation with high dc-link voltage. As drawback, the capacitors operate at the grid frequency, leading to anincrease of the bulk and weight of the conversion system. Moreover, the ac currents have high harmonic distortion due to absence of active control. Because of related problems, in [7] a three-phase

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Road condition, digital image segmentation: Satellite remote sensing imagery for highway location

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ARTICLE DETAILS

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Keywords
Remote sensing, digital image segmentation, road.

ABSTRACT

Remote detecting can be utilized to screen changes of black-top asphalt condition as a result of the unearthly difference in matured black-top material. Notwithstanding, inferable from coarse spatial goals of pictures and the constrained width of streets surrounding land spread sorts (for example vegetation, structures, and soil) influence the ghostly sign and add huge changeability and vulnerability to examination of street conditions.

1. Introduction

With quick urbanization and populace development, the requirement for successful administration of transportation and coordinations necessities are expanding everyday. While number of vehicles is relentlessly expanding, accessibility of land assets for structure new methods for recompense is draining.

To adequately address these difficulties, transportation experts worldwide have found and held onto GIS as a significant instrument in overseeing, arranging, assessing, and keeping up transportation frameworks.

GIS bolsters start to finish transportation foundation life cycle. With GIS, data from arranging procedure can be brought into the structure procedure and effectively continued into different territories, for example, as-constructed illustrations, activities, and upkeep.

Gains in both representative profitability and transportation framework execution are influenced conceivable by the one of a kind capacity of GIS to incorporate with a wide assortment of advances. Transportation associations advantage by utilizing the resultant data all through their undertaking for better basic leadership.

As of late, there is a quick improvement of street transportation organize. This circumstance emerges because of the quantity of vehicle out and about that continues expanding step by step. In this way, this will build the likelihood of risky circumstances to the street clients if streets are not being kept up fittingly. Hence, so as to protect the street in condition, the street the board movement ought to be improved. A total framework for street the board has been connected in the created nations for as far back as decades. Nonetheless, the utilization of use programming interface (API) from GIS programming has restriction to make adjustment regarding intelligence of the framework. Open source programming was proposed as an approach to help with diminishing the advancement cost of creating street observing framework. In this paper, open source programming was proposed as an approach to help with lessening the improvement cost in creating street the executives framework. OpenLayers structure was utilized as guide rendering stage. The framework can be utilized by head of street system to refresh the street data. In the meantime, it tends to be utilized by the street client too to see the data with respect to street related occurrences.

2. Literature review

GIS clients are in numerous branches of the entire organization. Various offices like street administration, resource the board, electrical designing, street organize arranging, building site offices and client administration focus profit by GIS data. 1-2]

The Road Network Planning office is in charge of long haul programs, setting up ideas and concentrates for mid-term exercises, executing explicit ventures (for example extra paths) and planning the building site program. GIS bolsters in imagining important upkeep exercises, building site extends and long haul programs by utilizing interfaces to SAP and Sharepoint. Besides, areas of rest territories und potential augmentations are appeared. Commotion assurance points are likewise part of the GIS. [3-5]

The Asset Management office is in charge of structure support the board, for example condition identification and evaluation, venture prerequisites and definition, foundation database and specialized appraisal of explicit transportation. GIS combination permits the land documentation of scaffolds, extension joints, holding dividers and commotion assurance dividers. [6-7]]

The interface to the Infrastructure Management Database empowers data to be given like the state of items, registration and observing. Connecting among GIS and Document Management System enables the clients to get to specialized documentation. [8-9]

Street Operation assignments contain subjects, for example, repair, redesigning and reestablishment works, street control administration, winter administration, cleaning rest and stopping regions and exploring and checking burrow wellbeing

FABRICATION AND INVESTIGATION OF MECHANICAL PROPERTIES OF AL 7075/B_4C/GR HYBRID METAL MATRIX COMPOSITES

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ABSTRACT

The present study involves the experimental investigation of hybrid metal matrix composite such as Al 7075 reinforced with particulates B_4C and Graphite by sand casting method. Aluminum Metal Matrix Composites (MMC's) possess its importance in the field of aerospace, automotive and marine applications owing to their improved properties. There is a growing interest worldwide in manufacturing hybrid metal matrix composites [HMMCs] which possesses combined properties of its reinforcements and exhibit improved physical and mechanical properties. In this work, the mechanical behavior of Aluminum Hybrid Metal Matrix Composites (HMMCs) has been investigated. Al7075 alloy was selected as matrix alloy and Boron Carbide (B_4C) and Graphite (Gr) were used as reinforcements for fabrication of HMMCs by sand casting. By The addition of the reinforcements enhances the mechanical properties of aluminium hybrid metal matrix composite. Mechanical properties such as hardness, tensile strength and microstructure were studied on the prepared composites.

Key words: *Al 7075, Graphite, B_4C (Boron carbide), Metal matrix composite (MMC), Sand casting.*

1. INTRODUCTION

Nowadays composite materials reinforced with different ceramic particles having high strength and toughness is developed to suit the varying needs in aerospace and automotive applications. To suit the requirements of engineering industries, the ceramic particles like Al_2O_3, boron carbide are mostly reinforced with the aluminum metal matrix for their improved mechanical properties like hardness, toughness, and low wear rate. Aluminium - Matrix based Metal Composites (MMCs) have received increasing attention in recent advanced engineering technology. Composite materials are known as advanced materials for their high strength, high wear resistance, good damping characteristic and their enhanced high temperature performance.

2. OBJECTIVE

The Main objective of this research is developing lightweight Aluminum metal matrix composites and analyzes the influence of boron carbide and graphite reinforcements. The

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A Virtual Synchronous Control for Voltage-Source Converters Utilizing Dynamics of DC-Link Capacitor to Realize Self-Synchronization

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Abstract: Voltage-source converters (VSCs) are widely used in renewable energy sources as the gridiron interface, e.g., wind turbine generators and photovoltaic. These VSCs ascendancy the dc-link capacitor voltage and the reactive power production to track the reference values, which generally apply phase-locked loop (PLL) for grid synchronization. However, the dynamic performance of the conventional PLL can be deteriorated when the VSC is integrated into weak grids, which may even cause instability of the VSC. In this paper, a virtual synchronous control (ViSynC) is proposed for VSCs, which utilizes the dynamics of the dc-link capacitor to realize self-synchronization. Grid synchronization mechanism of the ViSynC-based VSC is mainly analyzed in this paper. The sync-based VSC can provide inertial responses to the grid, and has the advantage that it can operate normally under weak grid conditions without any modification of the grid synchronization unit. Furthermore, virtual impedance and Q–V droop control can be easily applied in the control structure of the ViSynC. Simulations based on MATLAB and hardware-in-the-loop real-time simulations based on RT-LAB verify the effectiveness of the proposed Vsync

Index Terms—DC-link voltage control, grid synchronization, inertia emulation, virtual synchronous control (ViSynC), voltage-source converter (VSC), weak grids.

I. INTRODUCTION

The new power grid is qualified by the high insight of renewable energy sources such as wind turbine generators and photovoltaic, which are as a rule connected to the network via voltage source converters (VSCs) [1], [2]. The VSC can be affected as a controlled voltage source or current source whose phase and inside control strategies determine amplitude. These control strategies command the output characteristics of the VSC confronted to the power grid. Old control methods extract the maximum active power to the network so that the VSCs act as fi power sources and have fixed responses to frequency oscillations from the power grid [3], [4]. Since, it will result in the diminishing of the whole inertia of the power grid and weakens the frequency rule capability, which cannot fulfill the new grid code [5]. To take with this problem, frequency regulation schemes such as primary frequency control and inactivity emulation were acquainted in the power of VSCs [6]–[8].

There are mainly two methods to implement frequency regulation strategies. One is to modify the active power reference by introducing the feedbacks of grid frequency deviation signal (f) and the grid frequency derivative signal (d f /DT) in the control of VOCs [9]. This method is generally used for VSCs with vector control and a phase-locked loop (PLL). However, the maximum applied PLL, which is conceived to be the basis for grid synchronicity of the VSC, may cause instability to the VSC system with different parameters, especially when the VSC is merged to weak grids characterized by low short circuit ratio (SCR) [10], [11]. The reactivity and tracking performance of the ceremonious synchronous reference frame (SRF) PLL can degenerate in debile grids [12], [13], which may even result in the imbalance of dc-link voltage control [14].

To address this problem, the control construction of the old SRF-PLL should be modified. In [15], an impedance-conditioning term is brought in in the PLL so that the PLL-based VSC can control under weak grid conditions. Another method to achieve frequency regulation is practical synchronous machine (VSM) control [or virtual synchronous generator (SG)], which mimics frequency ordinance characteristics of SGs in order that the VSC can provide inertial reactions for the grid [16]–[18], and it can be given to wind turbine generators as well [19]. The PLL can be absented by competing for the SG's swing equation in the control of VSCs to realize grid synchronization [20], [21]. When classified by the control objectives, there are two main types of VSCs. One type of VSC assures the alive and reactive power outputs (abridged to PQ-type VSC in this paper) [18], which works at the condition that the dc-link voltage is fixed or is well controlled.

This PQ-type VSC is widely given as the grid port of energy storage systems, and can also be applied in one place of the VSC-HVDC transmission system to check the active power flow [22]. Different type of VSC controls the dc-link voltage and the reactive power output (abridged to DCVQ-type VSC in this paper) [23]. This DCVQ-type VSC is chiefly designed to control the dc-link voltage, and its active power output is ascertained by the dynamic power flow of the power network. For example in a back-to-back system, there is usually a PQ-type VSC on one side to assure the active power flow, and a DCVQ-type VSC on the other hand to control the dc-link voltage. The dc-link voltage is determined within the allowable range by the DCVQ-type VSC so that the two VSCs can operate pulse width modulation (PWM).

The DCVQ-type VSC is wide applied in renewable energy sources, e.g., the grid-side converters of wind turbine generators and photovoltaic [24]–[28]. Furthermore, it is also applied in one of the stations of VSC-HVDC systems and in dc micro grids for

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Title

Common Ground Type Transformerless Inverters for Single Phase Solar Photo-voltaic Systems

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Abstract

: It is the intention of a group of words that are multilevel inverters transformer less inverters for solar systems every one of the latest topologies was introduced based on the solar power systems principle and needs only four power switch and the unidirectional equipment (diode). One condenser and a tiny strainer at the final stage the main favor of the latest converter topologies was the minus pole of the solar power system is straightly attached to the grid and no discharge current. Reactive power damages the capacity The final AC voltage period is same to the starting DC-voltage a total detailing of the working principle with drone method, and examination imaginative comparisons are available to show the degree and quantification of the every topology in word to word form

Key Words

Transformer less inverter, flying capacitor, micro inverter, RB-IGBT inverters, photovoltaic system

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Common Ground Type Transformerless Inverters for Single Phase Solar Photo-voltaic Systems

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Abstract: It is the intention of a group of words that are multilevel inverters transformer less inverters for solar systems every one of the latest topologies was introduced based on the solar power systems principle and needs only four power switch and the unidirectional equipment (diode). One condenser and a tiny strainer at the final stage the main favor of the latest converter topologies was the minus pole of the solar power system is straightly attached to the grid and no discharge current. Reactive power damages the capacity The final AC voltage period is same to the starting DC-voltage a total detailing of the working principle with drone method, and examination imaginative comparisons are available to show the degree and quantification of the every topology in word to word form.

Index Terms—Transformer less inverter, flying capacitor, micro inverter, RB-IGBT inverters, photovoltaic system.

I. INTRODUCTION

The converters are used for the solar power systems. It is used for small power systems(upto 5km) by the using of electronics like diodes, and etc… the operating of the power systems is easy process and the price of the equipment is more but it is efficiently used. These type of controlling equipment's and the technological are very useful to the next generation people. In older days by the solar power the rare power producing is visible but in future the solar world will be designed by the latest version of equipment's. The solar systems is the most reliable in supply and the failure of grid is not very much possible it is the very hit view in the present and future global solar systems. The solar power systems can generate the DC supply so it is converted by using converters form dc supply to ac supply and step up the voltage level by the voltage regulator (T/F). by converting the power loss will be present and the core losses and iron losses are may weakens the efficiency and the power quantity so the voltage regulators are neglected in the converters or inverters the grid connected transformer less solar power systems

`Some days back there is a potent direction in the solar power system network to utilize voltage regulator less topologies in system to come two high ratio and less earth leakage current it is the low charge as tended to the equivalent to voltage regulator the different investigation to neglect the earth leakage current by the another technique in a transformer less electric converter removing the DC from AC side and/or fix the common mode voltage during the carefree duration the null state neglect topologies and group and the null state centre-point damped topologies in plus of the peak number of push button in the network path while the present state more the total on state resistance and therefore greater the total conductivity loss in the network the multi-level inverters is also used for decrease the earth leakage currents. Single earth type PV inverter can reliably decreases the earth current of the solar power system and has attracting a so much of interest from two academia and company it requires the six push buttons and a respective much large filter inductor. It is innovated by a charging capacitor, and it stores the charge when the first half cycle period and it is not able to charge in the another half cycle the output graphs and thus needs the condenser and the inductance then unfortunately gain the current tension in the push buttons the new common ground type core less inverter with only four push buttons category on a multilevel inverter concept the neutral of the network is straightly attached to the negative pole of the DC bus, which neglects the leakage current to increase the possibility of enlarging the circuit with same as concept and principle the double new common-ground type core less inverter are proposed in this paper.

To relative the basic inverter the four present push buttons are used which decreases the total on resistance of the push buttons in the current paths and eliminates the total conduction losses in separate to control the inverter the unipolar sinusoidal pulse width modulation is required which reduces the switching losses. In this paper section II is discuss about the principle of flying capacitor it is come by the addition of various switching devices and the flying capacitor.

1.1. SPACE VECTOR MODULATION

The space vector intonation technique is based on the reconstruction of the sampled reference voltage with the help of switching space vectors of a voltage source inverter in a sampling period. Each multilevel inverter has several changing states which generate Different voltage vectors and can be used to modulate the reference. In SVM, the +reference signal is generated from its closest signals. Some vectors have redundant +switching states, meaning that they can be made by more than one switching state this feature is used for the balance of capacitor voltages. Multilevel SVM must manage this behavior to optimize the search of the modulating vectors and apply an appropriate switching sequence.

An Establishment of Neutral Voltage Modulation Strategy for Multilevel Cascaded Inverters under Unbalanced DC Systems

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Abstract: It explains a pulse width modulation process to achieve a balanced line to line output voltages and to maximize the index of modulation in the way of linear modulation range where the output voltage can linearly maintain in the multilevel cascaded inverter (MLCI) operating at unbalanced dc-link conditions. In this process of MLSI, the linear modulation range is reduced, and a perfect output voltage imbalance may come as voltage reference increases. In the proposed method, too large of dc link imbalance avoids the balancing of the output voltages. This limitation has also discussed both simulations and experiments or projects for a seven-level phase-shifted modified MLCI for electric vehicle traction motor drive show that the proposed method can balance line to line output voltages as well as to increase the linear modulation range to peak under the unbalanced dc link conditions.

Index Terms—Harmonic injection, multilevel cascaded inverters (MLCIs), neutral voltage modulation (NVM), phase-shifted (PS) modulation, space vector pulse width modulation (PWM) (SVPWM).

I. INTRODUCTION

Multilevel inverters allow the synthesis of the sinusoidal output voltage from no of steps of voltages. For this reason, multilevel inverters have low di/DT characteristics and usually have low harmonics in the output voltage and current. The switching of very high voltage can be got by stacking multilevel inverter modules. Because of these advantages, multilevel inverters have been applied in different applications fields among different topologies for multilevel inverters; the multilevel cascaded inverter structure is one of the outstanding regional anatomies because of its simple construction for modularization and fault-tolerant capacity. Therefore MLCI is in the application of many things, such as dynamic voltage restores, static synchronous compensator, high voltage energy storage device. In MLCI applications, a modulations strategy to generate gating signals is very crucial to get high-performance control. Respect to this issue many studies have been done, and they are roughly categorized into multilevel selective harmonic deleting pulses width modulation, multilevel carrier-based PWM, & multilevel space vector PWM methods, generally a carrier-based PWM or SVPWM is preferred in some high-power static power converting applications. The series SVPWM method has been studied to cover the overmodulation range in a multilevel inverter.

On the other hand, MLCIs needs to be separated dc links, therefore, if there are one or more faults acquaint in the dc links in each phase as if the voltage orders of the dc links are inadequate, the output voltage of MLCI can be unbalanced without proper payment. To know this issue, some experiments have adequately been acquitted. It is demonstrated that the uncommitted modulation index is reduced under faulty considerations on switch modules in multilevel inverters and recompense algorithms are given for phase-disposition PWM & phase-shifted PWM cases. A neutral voltage shifting cases technique has been an introduction to balancing the state of change in the MLCI based battery energy storage system. A duty cycle modification technique has been proposed to correct an output voltage asymmetry caused by single-phase power fluctuations. Acknowledgment has shown that a zero sequence component helps to obtain the maximum balanced output voltage in a fault condition.

In this page, a carried-based PWM strategy to balance line to line output voltage and to maximize the lines modulation range where the output voltage in each phase is not linear. Accordingly, the linear modification range is deceased, and a significant output voltage imbalance may occur as output voltage references increased compared to the existing technique proposed schemes is very simple to follow and compensation the output voltage imbalance in real time. And rises to maximum the voltage utilization of the dc links. Therefore, if this technique is applied to applications such as EV traction drive systems, the dynamic characteristics can be more improved.

II. MULTILEVEL INVERTERS

In response to the developing demand for high power inverter units, multilevel inverters have been appealing growing attending from academia as well as the industry in the Holocene Decade. between the best-known topologies are the H-bridge

cascade inverter, the capacitor fastening inverter (imbricated cells), and the diode clamping inverter. As described in the literature, the H-bridge cascade inverter has been used in many practical instances for broadcasting amplifier [4], plasma [3], industrial drive [6] as well as STATCOM [7] applications etc. The main restriction of the H-bridge cascade inverter contain in the planning of an isolated power supply for each H-bridge cell When real power transfer is needed. For STATCOM application,

An Integration of PV System to a Three-Phase Distribution System Using an LWDF-Based Approach

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Abstract: This paper presents a multipurpose photovoltaic (PV) system using a lattice wave digital filter (LWDF)-based control advance. The various PV system is developed for integrating the active power to the distribution system with variable PV in-solation and correcting the nonlinear loads connected at the point-of-common-coupling. The PV system is multifunctional; therefore, it serves various purposes. It injects the active power of solar PV array to the grid. It extenuates harmonics of loads and provides grid currents balancing. The PV system incorporates a PV array, a boost converter, a voltage-source converter (VSC), a nonlinear load, and a distribution system. The boost converter is utilized for maximum power extraction from PV array using an incremental-conductance-based maximum power point tracking technique. To ascendance the grid-tied VSC, an LWDF-based control approach is proposed. Also, this advance can produce the desired sinusoidal fundamental component of load current to estimate the grid reference currents. The aim is to implement this control as it has many properties like low-pass band sensitivity, good dynamic response, and a decrease in a dc-offset noise error. The varieties of experimental results are presented to validate the control of a PV system

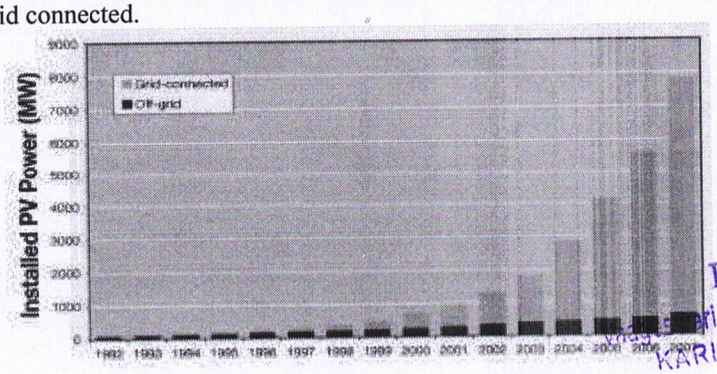
IndexTerms—Incremental conductance (INC) based maximum power point tracking (MPPT), lattice wave digital filter (LWDF) based approach, photovoltaic (PV), power quality.

I. INTRODUCTION

Generation of electricity through the photovoltaic (PV) Energy resource is the most potent solution among all the renewable energy sources [1] under variable atmospheric conditions. The PV energy is significantly promising and suitable technology for smart grid formation with the distributed network [2]. The cost of PV array is reducing day by day, and it is exposed for further reduction in next coming years. Therefore, grid integration of PV energy is gaining popularity day by day.

Whereas, grid integration is a cost-effective solution as it is not using any storage (batteries) system. In standalone PV systems, energy storage devices (batteries) have been utilized to store the Solar PV energy. The standalone PV system with energy storage the system is reported in [3]. An examination of the complication related with batteries, grid supportive PV systems are consider- Ered superior, where the grid is available. An inverter topology based on grid-connected and standalone mode is reported in [4]. In reported literature, an external current loop has been utilized for grid connection mode. In a grid-integrated system, the grid acts as energy storage where overall PV energy is fed. In the last few years, many grid-interfaced PV systems have been proposed [5], [6]. The grid supportive PV system with different converter topologies are reported in [7] and [8]. Whereas, voltage-source converter (VSC) is still favorable converter over the other converters for PV system because of its simplicity and a wide range of operating frequencies.

Decentralized energy output using solar energy could be a result for balancing endlessly-increasing energy needs. Grid-connected PV systems have had a tremendous increase in their market share over the concluding decade. With a sane set of incentives, the solar photovoltaic market in the U.S. could arise more than 30% /year over the next 20 years, from 340MW of installed capacity to 9600 MW. This market development is also present in other countries worldwide. Allotting to the latest report of IEA PVPS on established PV power, during 2007 there was a total of 2.25 GW of set up PV systems, of which the majority (90%) are constituted in Germany, Spain, USA, and Japan. At the end of 2007, the total set up PV capability attained 7.9 GW of which around 92% is grid connected.



A Synchronous Buck DC-DC Converter using Novel Dual mode Control Scheme to Improve Efficiency

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Abstract: One of the most popular converters for the consumer electronics industry is the Dc to Dc step-down converter, also known as the buck converter the synchronous buck can converter is used to step a voltage down from a higher level to a lower level, with industry moving to higher performance platforms, efficiency of the power converter is critical. This synchronous buck converter is work at heavy load conditions in the continuous conduction and light load conditions in the discontinuous conditions in this switched mode converters can be found in power supplies & battery charging circuitry for computers, electric and electronic devices.

Index Terms—quasi-resonant valley switching, ZVS, auxiliary circuit.

I. INTRODUCTION

This chapter consists of insight into the design and development of the most commonly Used DC-DC converters. The following sections contain DC-DC converter basics, a summary of converter control information, common topologies with necessary design equations including isolated converters, supplemental circuits such as gate drivers and protection circuits, practical considerations in converter design, and other essential converter development details.

A DC-DC converter in this chapter is defined as any power electronics system with a a primary function of taking, as an input, DC power from a source with a given volts-amps characteristic, and producing as an output DC power with a specified volts-amps characteristic. The volts-amps characteristics may be as simple as maximum and minimum voltages and currents, or more complex characteristic curves that may be dependent on other outside parameters, such as current control requirements, or photovoltaic or fuel cell Power output characteristics. Other converter requirements may include voltage regulation requirements; input and output impedance specifications to better match filters, loads, and sources; ambient operating temperature range; and requirements concerning vibration, efficiency, lastingness, reliability, protection, weight, volume, manubrium, Cost, and applicable standards.

Typically, a first step in the development or procurement of a DC-DC converter is to create a specification addressing each of these areas in detail utilizing technical criteria of the IEEE, UL, SAE, NEC, ANSI, and CENELEC as sources of reference. On commercial-grade vehicle coatings the most crucial aspects of the design are enduringness, reliability, and cost. Vehicle applications ask special attention be given to thermal and oscillation conditions in the design and boxing, as vehicles can be exposed to harsh environments, and engine spaces and other parts of a vehicle tend to be extremely hot or cold in certain climates. DC-DC converters are typically used for power supplies for other circuits: battery charging, welders, heaters, up converters that transfer power from a lower DC voltage bus to a higher DC voltage bus, and downconverters that transfer energy from a more top DC voltage bus to a smaller DC voltage bus. DC-DC converters are also used in DC motor drives, AC machine field control circuits, and power factor correction circuits. DC-DC converters are often combined with other types of power converters such as inverters and rectifiers to form more complex power converters such as DC-to-AC and AC-to-DC converters. The inverter-driven DC-DC converters, i.e., the push-pull, half-bridge, and full bridge, consist of a DC-AC stage followed by an AC-DC stage: an inverter-rectifier two-stage system. All of the other types discussed in this chapter are purely DC-DC converters.

II. DC-DC CONVERTER TYPES

There are many types of DC-DC converters including buck or step-down, boost or step up, buck-boost (step-up or -down), flyback, Cúk, Sepic, resonant types, and inverter-driven Types: push-pull, half-bridge, and full-bridge. The highest power levels that need DC-DC conversion use paralleled DC-DC converter units that operate with "phasing" that requires the switching pulses of each of the paralleled units be staggered or "phased" through 360 degrees, such that a higher frequency current ripple is present in the combined converter, reducing the filtering requirements, increasing the volume of similar parts used, and thus reducing costs. Alternatively, for higher power systems, an inverter-rectifier System or DC-AC/AC-DC two-stage system is used with a step-up or step-down transformer to provide the DC-DC conversion. In the presentations of the converter types that follow, only the continuous current mode of operation covered for converters without parasitic. The constant current process means that the inductor current in the converter is ongoing, never staying at zero flow. At the boundary of continuous and discontinuous conduction, the current in the inductor will reach zero at the lowest peak of the current waveform once each cycle. The discontinuous mode of operation is typically. The buck, boost, and buck-boost converters each consist of a power switch, a diode, and an inductor, and are often accompanied by an output filter capacitor and input filter. The arrangement of the components varies slightly from one topology to the next, as will be discussed in the sections to follow; however, some similarities will first be presented.

Design of DC to Single-Phase AC Voltage Source Converter with Active Power Decoupling Based on Flying Capacitor DC/DC Converter

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Abstract: Nowadays, a power decoupling method used for a dc to single-phase ac converter that uses a flying capacitor dc/dc converter (fcc) & also the voltage source inverter. In practice a small flying capacitor is used for both a boost operation and a double-line-frequency power ripple reduction a sizeable electrolytic capacitor is replaced by dc-link capacitor components design of, e.g., the boost inductor & the flying capacitor are for controlling experiments are being done using a 1.5 kW prototype to come to know about validity of the proposed control from above tests shown that 74.5 dc link voltage ripple is reduced & also total harmonic distortion at load of 1.1kw max system efficient 95.4% is resulted from Pareto format optimization the high power density the power densities of 3 power decoupling topologies boost topology, a buck topology and the proposed topology are compared the proposed topology achieve the (5.3kw/dm) power density.

Index Terms—Active power decoupling, flying capacitor dc/dc converter (FCC), photovoltaic (PV) system, power density design.

I. INTRODUCTION

The research on photovoltaic (PV) is increased as a sustainable power solution photovoltaic serving 228GW in2015 to connect the photovoltaic (PV) source to single phase ac grid power converter systems (pass) are used these PCSs should have high efficiency, maintenance free, small size. To achieve above parameters 2-stage conversion using a dc/dc converter & a voltage source (VSI) is generally applied for high efficiency & high power density flying –capacitor dc/dc converter used in 2-stage power conversion by using a low on-resistance switching power device owing to the use of low voltage rating those advantage are obtained by this technique harmonics of inductor voltage can decreased for that reason inductor volume can also decreased the switched capacitor converter (SCC) is a commonly used configuration in FCC converter topology without large inductor the boost-up operation can be achieved by SCC. A small inductor is used on dc side to avoid inrush current due to the flying capacitor a small inductor flying capacitor is used on dc side also serve for a high boost ratio.

Due to the single-phase ac grid double line frequency power ripple occurs in the dc side due to this ripples in a performance maximum power point tracking (MPPT) would decrease. To decrease power ripple a bulky electrolytic capacitor is used, i.e., a passive power decoupling method. According to the Arrhenius law electrolytic capacitor limits the life-time of the power converter.

Active power decoupling methods used to solve this problem small passive energy buffer & switching devices used in active power decoupling power ripples are compensated by active power decoupling rather than an electrolytic capacitor, it uses film capacitor or ceramic capacitor.

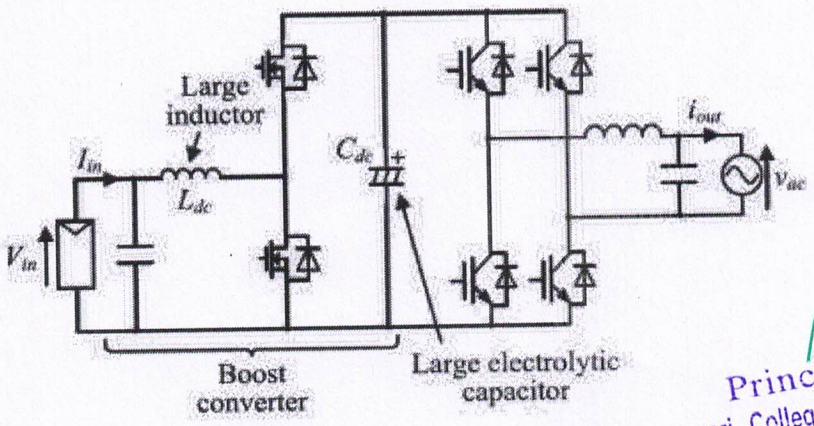

Fig. 1. DC to single-phase ac grid-connected converter with typical boost converter.

PERFORM`ANCE OF THREE PHASE II-LEVEL INVERTER WITH REDUCED NUMBER OF SWITCHES USING DIFFERENT PWM TECHNIQUES

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Abstract-As compared to conventional inverter topologies like diode clamped and capacitor clamped inverters, the cascaded multilevel inverter has lesser harmonics as well as lower switching stress. The cascaded topology has more number of power switches leading to greater heat losses, larger size, higher cost and more gate drive circuitry. The proposed configuration contains less number of switches and produces lesser harmonics in the output voltage than the cascaded topology. A comparison between four different types of pulse width modulation (PWM) techniques, namely, In-phase disposition (IPD), Anti-phase disposition (APD), Carrier Overlap (CO) and Variable Frequency (VF) PWM methods, has been done. The results have been verified through simulation study in MATLAB/Simulink inorder to select the best PWM method that provides minimum THD in the output voltage. An LC filter has been designed to improve the harmonic profile.

Keywords: Multilevel inverter, PWM technique, total harmonic distortion, LC filters.

I. INTRODUCTION

Power electronic devices play a major role in the conversion and control of electric power, especially to extract power from renewable energy sources like photovoltaic array and wind energy [1]. Conversion of DC to AC power can be done with the help of inverters (single phase or three phases). Conventional bipolar inverters produce alternating staircase waveforms with higher harmonics. Thus, the multilevel inverters (MLI) were developed [2]. This paper provides a new three phase configuration to produce the II-level output with less total harmonic distortion (THD) in its output voltage. IPD, APD, CO and VF PWM techniques were used to produce switching pulses[3].

The cascaded H-bridge (CHB) configuration has lesser number of components as compared to the conventional diode clamped or capacitor clamped inverters [4]. It contains single phase inverters connected in series with separate DC sources that can be derived from renewable energy sources like solar PV cell, bio fuel cell or wind turbine [5]. Each single phase inverter produces two DC voltage levels. Bridges with separate DC sources are cascaded to each other for more DC levels. The switches operate at fundamental frequency of 50Hz. The diode clamped MLI has 20 switches, 90 diodes and 10 main DC-bus capacitors per phase to produce an 11- level staircase as the output voltage. The capacitor clamped MLI uses 20 switches, 45 clamping capacitors and 10 main DC-bus capacitors per phase whereas the cascaded H-bridge inverter uses only 24 switches per phase to produce the same output [6-7]. This paper describes a single phase inverter configuration with eight switches and three DC sources. A three phase multilevel inverter is obtained by interconnecting three single phase inverters to a star connected pure resistive load with a common earth point. Therefore, this circuit offers lesser gate control

Principal

A Zeta Converter for Power Quality Improvement in Brushless DC Motor Drivers

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Abstract: This study deals with a decreased sensor arrangement of power factor correction (pfc) based zeta converter for brushless DC (BLDC) motor drive for low power applications in this the speed is controlled by varying the DC-link voltage of voltage source inverter low frequency switching is utilized to accomplish of electronic commutation of BLDC motor for reduced switching losses. The pfc based zeta converter operator in discontinuous mode by utilizing the follower approach a single sensor is required to control dc-link voltage the suggested drive is designed to achieve wide range of speed and also operate at unity power factor to improve power quality at supply mains.

***IndexTerms*–Solar PV, Battery storage, Inverter, Grid, Energy Management.**

I. INTRODUCTION

- **POWER QUALITY:**

Generally power quality problems defined as: 'Any power problem that results in failure or disorientation of customer equipment, demonstrates itself as an economic burden to the user, or produces negative impacts on the environment.' When applied to the instrumentality crane industry, the power issues which disgrace power quality include:

- Power Factor
- Harmonic Distortion
- Voltage Transients
- Voltage Sags or Dips
- Voltage Swells

The AC and DC variable speed drives employed on control panel container cranes are significant subscribers to total harmonic current and voltage deformation. Whereas SCR phase control creates the worthy average power factor, DC SCR drives engage at less than this. In addition, line incising occurs when SCR's change by reversal, creating ephemeral peak recovery voltages that can be 3 to 4 times the nominal line voltage depending upon the system impedance and the size of the drives. The frequency and austereness of these power system disruptions varies with the speed of the drive. Harmonic current inject ant by AC and DC drives will be highest when the drives are operating at deadly speeds. Power factor will be lowest when DC drives are operating at deadly speeds or during initial quickening and retardation periods, increasing to its maximum value when the SCR's are phased on to produce rated or baseborn speed. Above base speed, the power factor fundamentally remains constant.

Regrettably container cranes can spend healthy time at depleted speeds as the operator seeks to spot and land containers. Inadequate power factor places a greater kVA demand burden on the usefulness or engine-alternator power source. Low power factor loads can also impact the voltage stability which can at long last result in prejudices effects on the life of sensible electronic equipment or even intermittent malfunction. Voltage oscillations created by DC drive SCR line putting down, AC drive voltage choppily and high frequency harmonic voltages and currents are all s igneous sources of noise and disturbance to spiritualist electronic equipment.

It has been our receive that end users often do not associate degree power quality problems with instrumentality cranes, either because they are totally incognizant of such issues or there was no economic aftermath if power quality was not self-addressed Before the Parousia of solid-state power supplies, Power factor was sensible and harmonic current injection was minimal. Not until the crane Population man folded, power demands per crane increased, and static power conversion became the way of life, did power quality issues begin to come out Even as harmonic distortion and power Factor issues came up, no one was really devised.

Even today, crane builders and electrical drive System marketers avoid the issue during competitive adjuring for new cranes. Rather than focus on Awareness and understanding of the potential issues, the power quality issue is deliberately or accidentally ignored. Power quality problem solutions are available. Although the solutions are not free, in most cases, they do represent a good return on investiture. However, if power quality is not specified, it most likely will not be delivered. Power quality can be ameliorated through.

1.1. Bridge Rectifier

Thyristor single-phase bridge (Figure 1) engages on the same rationale as the diode single-phase bridge rectifier, excluding that each thyristor leads off to conduct only when a current pulse is interposed into the gate (allowing for that the thyristor is advancing biased). Once a thyristor contributes off to conduct, it continues to conduct until the current feeding through it becomes

A Periodic Modulation Method to Mitigate Electromagnetic Interference in Impedance Source DC-DC Converters

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Abstract: Quick voltage and current experience a transition in switched mode power changing state into another circuit bring into being ness to an electromagnetic disturbance which may pose obstacle with other electronic schemes. High pressure (e.g.:- wide band gap) switching device can make betters electrical circuit of the ratio of output to the input of the system and the spatial property of being crowded to gather but may gain the data transition rate of the distance produce. The peak distance is gathered together at harmonics of the lowest tone of a harmonic less in size by regulating the convertor switching frequency, however, a device may not be appropriate to regulation of the switching frequency and interconnected control of other impulse parameters is requisite to oppress disturbance a comparatively common execution hybrid impulse regulation proficiency is conferred to oppress electromagnetic disturbance quasi-z-sources convertor contain a resistance- sources network and Gan based H-bridge switching circuit.

Index Terms—Impedance source power converters, pulse modulation, electromagnetic interference (EMI), interference suppression, wide bandgap (WBG) semiconductors

I. INTRODUCTION

Generally power appends, the two eminent types of EMI are conducted EMI and radiated EMI. Comprehensive ordinances allow for limitations to radiate and conducted EMI brought forth when the power supply is associated to the mains. Comparing the modern power switches used in power supplies with those from aged generations, the new switches have importantly abridged switching times, ahead to faster and faster rise and fall times for the voltage and current waveforms. These fast adjoins produce substantial energy at amazingly high frequencies, and are the root crusade of all EMI problems in switched-mode power supplies. This high-frequency energy crusade ringing in all the resonant tanks, small or large, that exist within the power supply. In general, this deforming does not cause problems; however, in some cases, this may stop the power supply from working decent or authorizing tests. Faster switching also averages that losses can be abridged and amending the efficiency of the power supply. But faster switching should also modify more eminent switching frequencies at last leading to smaller passive components and better ephemeral demeanour – a promise that has not been accomplished. The main reasons for this are the cost of transformers for use at these frequencies and the disproportionate complexity of solving high-frequency EMI problems. Resonant and quasi-resonant topologies offer a graceful way out of this quandary. They have been approximately for a long time, but due to restrictions, they have not been widely accepted. The predisposition to load and line ordinances can limit their ingestion and parameter variations of passive components can make series yield unmanageable and eminent -priced. Further, for some coiffures of the power supply (e.g., secondary side post-ordinance) a resonant version does not enormously exist. It is only with today's advanced control ICs that quasi-resonant power supplies show their possible while asserting good EMI carrying into action. So it is not forcing that more and more conceptions are using this topology. Given these new evolutions, it is clear that EMI performance can no more farsighted be believed only after the power supply design is completed. It needs to be planned into the power supply right from the start at stipulation level, just like reliability and safety, determining topology and component choice. The goal is to meet EMI ordinances while not distressful other coverings nearby. The power supply should also be self-manipulable and abide by a plastered amount of EMI from the beyond. It will show how to "embed" EMI circumstances throughout the entire conception cycle. The determined is to give the power supply decorator a reasonable apprehension of the problem, and an overview of the evaluates that can be taken while designing and proving the power supply, to enhance time to market and to come up with a racy conception.

II. DIFFERENT TYPES OF EMI AND THEIR CHARACTERISTICS

Three matters can campaign an EMI problem: A signal the source produces some kind of disturbance; there is a transmission the path for the interference and there is a receiver sensitive enough to be distorted by the interference, as shown in Figure 1.

A Virtual Synchronous Control for Voltage-Source Converters Utilizing Dynamics of DC-Link Capacitor to Realize Self-Synchronization

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Abstract: Voltage-source converters (VSCs) are widely used in renewable energy sources as the gridiron interface, e.g., wind turbine generators and photovoltaic. These VSCs ascendancy the dc-link capacitor voltage and the reactive power production to track the reference values, which generally apply phase-locked loop (PLL) for grid synchronization. However, the dynamic performance of the conventional PLL can be deteriorated when the VSC is integrated into weak grids, which may even cause instability of the VSC. In this paper, a virtual synchronous control (ViSynC) is proposed for VSCs, which utilizes the dynamics of the dc-link capacitor to realize self-synchronization. Grid synchronization mechanism of the ViSynC-based VSC is mainly analyzed in this paper. The sync-based VSC can provide inertial responses to the grid, and has the advantage that it can operate normally under weak grid conditions without any modification of the grid synchronization unit. Furthermore, virtual impedance and Q–V droop control can be easily applied in the control structure of the ViSynC. Simulations based on MATLAB and hardware-in-the-loop real-time simulations based on RT-LAB verify the effectiveness of the proposed Vsync

Index Terms—DC-link voltage control, grid synchronization, inertia emulation, virtual synchronous control (ViSynC), voltage-source converter (VSC), weak grids.

I. INTRODUCTION

The new power grid is qualified by the high insight of renewable energy sources such as wind turbine generators and photovoltaic, which are as a rule connected to the network via voltage source converters (VSCs) [1], [2]. The VSC can be affected as a controlled voltage source or current source whose phase and inside control strategies determine amplitude. These control strategies command the output characteristics of the VSC confronted to the power grid. Old control methods extract the maximum active power to the network so that the VSCs act as fi power sources and have fixed responses to frequency oscillations from the power grid [3], [4]. Since, it will result in the diminishing of the whole inertia of the power grid and weakens the frequency rule capability, which cannot fulfill the new grid code [5]. To take with this problem, frequency regulation schemes such as primary frequency control and inactivity emulation were acquainted in the power of VSCs [6]–[8].

There are mainly two methods to implement frequency regulation strategies. One is to modify the active power reference by introducing the feedbacks of grid frequency deviation signal (f) and the grid frequency derivative signal (d f /DT) in the control of VOCs [9]. This method is generally used for VSCs with vector control and a phase-locked loop (PLL). However, the maximum applied PLL, which is conceived to be the basis for grid synchronicity of the VSC, may cause instability to the VSC system with different parameters, especially when the VSC is merged to weak grids characterized by low short circuit ratio (SCR) [10], [11]. The reactivity and tracking performance of the ceremonious synchronous reference frame (SRF) PLL can degenerate in debile grids [12], [13], which may even result in the imbalance of dc-link voltage control [14].

To address this problem, the control construction of the old SRF-PLL should be modified. In [15], an impedance-conditioning term is brought in in the PLL so that the PLL-based VSC can control under weak grid conditions. Another method to achieve frequency regulation is practical synchronous machine (VSM) control [or virtual synchronous generator (SG)], which mimics frequency ordinance characteristics of SGs in order that the VSC can provide inertial reactions for the grid [16]–[18], and it can be given to wind turbine generators as well [19]. The PLL can be absented by competing for the SG's swing equation in the control of VSCs to realize grid synchronization [20], [21]. When classified by the control objectives, there are two main types of VSCs. One type of VSC assures the alive and reactive power outputs (abridged to PQ-type VSC in this paper) [18], which works at the condition that the dc-link voltage is fixed or is well controlled.

This PQ-type VSC is widely given as the grid port of energy storage systems, and can also be applied in one place of the VSC-HVDC transmission system to check the active power flow [22]. Different type of VSC controls the dc-link voltage and the reactive power output (abridged to DCVQ-type VSC in this paper) [23]. This DCVQ-type VSC is chiefly designed to control the dc-link voltage, and its active power output is ascertained by the dynamic power flow of the power network. For example in a back-to-back system, there is usually a PQ-type VSC on one side to assure the active power flow, and a DCVQ-type VSC on the other hand to control the dc-link voltage. The dc-link voltage is determined within the allowable range by the DCVQ-type VSC so that the two VSCs can operate pulse width modulation (PWM).

The DCVQ-type VSC is wide applied in renewable energy sources, e.g., the grid-side converters of wind turbine generators and photovoltaic [24]–[28]. Furthermore, it is also applied in one of the stations of VSC-HVDC systems and in dc micro grids for

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A QUAD TWO LEVEL INVERTER CONFIGURATION FOR FOUR POLE INDUCTION MOTOR DRIVE WITH SINGLE DC LINK

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ABSTRACT: A multilevel inverter topology for a four-poleinduction-motor drive is presented in this paper, which is constructed using the induction-motor stator winding arrangement. A single dc source with a less magnitude when compared with conventional five-level inverter topologies is used in this topology. Therefore, power balancing issues (which are major challenges in conventional multilevel inverters) are minimized. As this configuration usesa single dc source, it provides a path for zero-sequence currents because of the zero-sequence voltages present inthe output, which will flow through the motor phase winding and power electronic switches. To minimize these zero-sequence currents, sine–triangle pulse width modulation (SPWM) is used, which will shift the lower order harmonicsnear to switching frequency in the linear modulation region. However, in the case of over modulation, harmonic voltages will be introduced close to the fundamental frequency. In this regard, a modified SPWM technique is proposed in thispaper to operate the drive in the over modulation region up to the modulation index of 2 /√3. The proposed quad two-level inverter topology is experimentally verified with alaboratory prototype on a four-pole 5-hp induction motor. Experimental results show the effectiveness of the proposed topology in the complete linear modulation region and the over modulation region.

1. INTRODUCTION

Multilevel inverter technology has been widely usedfor the control of medium- and high-voltage ac drive applications from the past few decades [1] because of its improved output voltage quality [2], better harmonic performance [3], less voltage stress on power electronic devices [4], and so on. The basic concept of multilevel inverters is to achieve the staircase voltage waveform by using more low-rated power electronic switches and voltage sources. As the number of output voltage levels increase, the requirement of series-connected switches will also increase in the case of conventional multilevel inverters such as diode-clamped and flying-capacitor (FC) multilevel inverters. Therefore, if any of the switches fails, the entire topology has to be shut down [5], [6], resulting in decreased system reliability. Moreover, these topologies have some inherent drawbacks such as neutral-point voltage balancing [7] and capacitor voltage balancing [8] problems, which in turn cause unequal voltage sharing across the switches and adds dc offset voltage to the output voltage waveform. Therefore, special capacitor voltage balancing techniques are needed to eliminate these issues [9]. The reliability of the system can be increased using the H-bridge configuration, as presented in [10], which will also eliminate the capacitor voltage balancing issue and the neutral-point voltage balancing issue. However, as the number of voltage levels increase, it requires more isolated dc sources [11]. Another

DESIGN AND TRANSIENT OPERATION ASSESSMENT OF RESONANT FCLS IN BULK POWER SYSTEMS

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Abstract:- The increasing capacity of power systems and the continuing growth in interconnections within transmission networks to improve the reliability may cause the short-circuit fault current level of the equipment in the system, including the existing circuit breakers, to exceed their rated capacities. Therefore, the equipment must be either upgraded or replaced, which is costly and requires time-intensive procedures. Fault current-limiting techniques offer benefits to the system in such cases. Using passive elements, such as current-limiting reactors, is a well-known practice in power systems: however, they impact the power flow under normal operation, cause voltage drop, and might reduce the transient stability. Alternatively, resonant fault current limiters (RFCL) offer a dynamic solution based on proven technologies of current-limiting reactors and series capacitors. This paper presents a comprehensive framework to design RFCLs in bulk power systems. The presented approach uses a combination of mathematical analyses and numerical time-domain simulations to design the RFCL elements, and its effectiveness is assessed in test power systems.

I. INTRODUCTION

Interconnections within a bulk power system improve the reliability and offer several benefits to the overall system. However, they may cause some equipment, such as circuit breakers (cbs), to experience short-circuit fault currents that exceed their rated capacities. Current-limiting techniques can help reduce the fault current and, thus, eliminate the need for immediate CB upgrades. Fault current reduction using passive elements, such as current-limiting reactors, is a well-known practice especially in low-voltage (LV) systems. However, they have some drawbacks in high-voltage (HV) transmission networks, such as impacting the power flow under normal operation, causing voltage drop and risk of voltage collapse, and having an adverse impact on the transient stability of power systems [1]. Therefore, active fault current limiters (FCL) based on new technologies have emerged to alleviate the aforementioned issues.

These fcls have low impedance under normal operation and acquire large impedance upon the inception of a fault. The operation includes limiting the first current peak below the instantaneous current capabilities of the existing equipment, and the subsequent current peaks to a level which allows correct operation of protection relays, while remaining within the interrupting capabilities of cbs. The main challenges in using sfcls, especially for HV applications, include the requirement for an extensive cooling mechanism and sophisticated electrical insulation technologies, which can reduce the reliability of these devices [5].

FCLs that incorporate solid-state valves in their configuration operate based on two main concepts [6]. In the first concept, the solid-state valves are conducting under normal operation of the system and are turned off, right after a fault is detected, to commutate the current to a current-limiting element, for example, a reactor. Moreover, RFCL is a dynamic solution based on proven and reliable technologies of current-limiting reactors and series capacitors, and is commercially offered for HV applications by some companies [5]. However, operation

CONTROL OF A SMALL WIND TURBINE IN THE HIGH WIND SPEED REGION

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Abstract—This paper proposes a new soft-stalling control strategy for grid-connected small wind turbines operating in the high and very high wind speed conditions. The proposed method is driven by the rated current/torque limits of the electrical machine and/or the power converter, instead of the rated power of the connected load, which is the limiting factor in other methods. The developed strategy additionally deals with the problem of system start up preventing the generator from accelerating to an uncontrollable operating point under a high wind speed situation. This is accomplished using only voltage and current sensors, not being required direct measurements of neither the wind speed nor the generator speed. The proposed method is applied to a small wind turbine system consisting of a permanent magnet synchronous generator (PMSG) and a simple power converter topology. Simulation and experimental results are included to demonstrate the performance of the proposed method. The paper also shows the limitations of using the stator back electromotive force to estimate the rotor speed in PMSG connected to a rectifier, due to significant d-axis current at high load.

Index Terms—Energy management, micro wind generator, small wind generator, soft-stalling control, torque control, wind energy, wind power generation.

I. INTRODUCTION

Renewable energy generation and integration are important topics not only from an electrical engineer perspective but also from a social perspective, due to environmental, economic, and strategic reasons. For small consumers, the interest in energy self-production is growing due to the rise of the electricity price, especially in countries without gas and oil production. One of the more affordable and efficient technologies to produce electricity for residential or small business consumers are small wind turbines [1]–[3]. Small wind turbine systems can inject the energy directly into the grid [4] or store the captured energy in batteries. The system presented in this paper is intended for grid-tied operation. Different power converter topologies have been proposed for the case of grid-tied applications. The most widely used converter topology on the generator side for low-power grid-tied systems consists of a diode rectifier and a boost converter. Alternatively, a boost rectifier has also been proposed. To interface the generating system with the grid, either an H-bridge inverter [4]–[7] or three phase inverter can be used. However, that solution implies a more complex control and the need of a shaft position sensor. The simplest topology based on the passive rectifier, boost rectifier, and H-bridge converter is used in the present study.

One of the challenges in the operation of small wind turbines is the control and protection under high wind speeds. Whenever the wind power exceeds the turbine power rating, the turbine must be operated below its maximum efficiency point to prevent damage. Some braking mechanism must be enabled if the wind power excess is too high. Pitch control, furling control, stall control, mechanical brakes, and electric brakes have been proposed for

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POWER FACTOR IMPROVEMENT AND DYNAMIC PERFORMANCE OF AN INDUCTION MACHINE WITH CONVERTER-FED ROTOR

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Abstract—This paper investigates an induction machine with a novel concept of the rotor fed by a converter. The stator is Y connected and directly connected to the grid, while the rotor windings are open-ended and fed by a back-to-back converter with a floating capacitor. Power factor and efficiency improvements of the induction motor are studied with different settings of phase-shift angle between the two converters. Moreover, the dynamic performance of the induction machine is explored in MATLAB/ Simulink and verified experimentally on a 1.8-kW induction machine in the laboratory. The result shows good agreement between simulation and experiment. At a constant speed, variable load operation of the induction machine is obtained by setting the frequency of the rotor voltage.

I. INTRODUCTION

The induction machine is widely used in industry because of its reliability, robustness and cost effectiveness. One inherent drawback of induction machines is that they draw reactive power from the grid and the power factor can be poor. Especially when the machine starts or operates with light loads, power factor and efficiency are drastically reduced [1]. Power factor improvement of induction machine is thus attractive and has been pursued for decades.

The simplest way to compensate the reactive power is to connect capacitor banks at the machine terminals. However, an unsuitable selection of capacitance may result in overvoltage due to self-excitation when the machine is disconnected from the supply, which could damage the machine [1]–[4]. This approach is not flexible since different capacitances are needed when the loading condition changes. A scheme of supplying variable capacitance is proposed in [5], where the induction machine is directly connected to the grid while a three phase pulse width modulation (PWM) converter with a floating capacitor is connected at the induction machine terminals. However, the improved power factor is realized only for the grid but not for the induction machine itself. The losses in the machine are not reduced thus the machine still suffers from poor power factor and hence poor efficiency.

In the 1980s, as an alternative to improve the mains power factor, the stator windings of a cage-rotor induction machine were rewound to achieve unity power factor [6], [7]. The stator windings were divided into two groups with different number of turns. The two sets of windings were electrically connected. This attracted a lot of interest at that time [8]. Different connections of two sets of identical stator windings are investigated in [9]. The results from [6], [9] both show that the mechanical output capability of the rewound induction machine is reduced compared with the original machine.

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CONTROL AND OPERATION OF A DC GRID-BASED WIND POWER GENERATION SYSTEM IN A MICRO GRID

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***Abstract*—This paper presents the design of a dc grid-based wind power generation system in a poultry farm. The proposed system allows flexible operation of multiple parallel-connected wind generators by eliminating the need for voltage and frequency synchronization. A model predictive control algorithm that offers better transient response with respect to the changes in the operating conditions is proposed for the control of the inverters. The design concept is verified through various test scenarios to demonstrate the operational capability of the proposed micro grid when it operates connected to and islanded from the distribution grid, and the results obtained are discussed.**

***Index Terms*—Wind power generation, dc grid, energy management, model predictive control.**

I. INTRODUCTION

Poultry farming is the raising of domesticated birds such as chickens and ducks for the purpose of farming meat or eggs for food. To ensure that the poultries remain productive,
the poultry farms in Singapore are required to be maintained at a comfortable temperature. Cooling fans, with power ratings of tens of kilowatts, are usually installed to regulate the temperature in the farms [1]–[3]. Besides cooling the farms, the wind energy produced by the cooling fans can be harnessed using wind turbines (WTs) to reduce the farms' demand on the grid. The Singapore government is actively promoting this new concept of harvesting wind energy from electric ventilation fans in poultry farms which has been implemented in many countries around the world [4]. The major difference between the situation in poultry farms and common wind farms is in the wind speed variability. The variability of wind speed in wind farms directly depends on the environmental and weather conditions while the wind speed in poultry farms is generally stable as it is generated by constant-speed ventilation fans. Thus, the generation intermittency issues that affect the reliability of electricity supply and power balance are not prevalent in poultry farm wind energy systems.

In recent years, the research attention on dc grids has been resurging due to technological advancements in power electronics and energy storage devices, and increase in the variety of dc loads and the penetration of dc distributed energy resources (DERs) such as solar photo voltaics and fuel cells.

Many research works on dc micro grids have been conducted to facilitate the integration of various DERs and energy storage systems. In [5], [6], a dc micro grid based wind farm architecture in which each wind energy conversion unit consisting of a matrix converter, a high frequency transformer and a single-phase ac/dc converter is proposed. However, the proposed architecture increases the system complexity as three stages of conversion are required. In [7], a dc micro grid based wind farm architecture in which the WTs are clustered into groups of four

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ASSESSMENT AND ENHANCEMENT OF A FULL-SCALE PMSG-BASED WIND POWER GENERATOR PERFORMANCE UNDER FAULTS

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Abstract: ***A full-scale permanent-magnet synchronous generator (PMSG)-based wind turbine with dc-link voltage control via the machine-side converter has the potential to provide inherent low-voltage ride-through (LVRT) performance without additional hardware components. However, several important performance aspects related to this topology are not addressed in this literature. This paper investigates the impacts of the LVRT control on the stability and risk of resonance, successful operation, and fatigue in a full-scale PMSG-based wind power generation system. An analytical model, considering the double-mass nature of the turbine/ generator and typical LVRT requirements, is developed, validated, and used to characterize the dynamic performance of the wind generation system under LVRT control and practical generator characteristics. To enhance the operation and reduce the fatigue under LVRT control, two solutions, based on active damping control and dc-link voltage bandwidth retuning, are proposed, analyzed, and compared. The detailed nonlinear time-domain simulation results validate the accuracy of the developed model and analytical results.***

1. INTRODUCTION

Wind turbines technology has become very advanced So that wind power is considered as a major green source In modern power systems. Therefore, the penetration level of Wind power generation is increasing rapidly with no signs of Slowing down [1]–[3].While the classical issues of wind power, Such as extracting the maximum available wind power, have Been solved, the increased penetration level of wind power is Creating new problems for power systems. Incorporating wind Power generators in frequency regulation and low-voltage ride thorough (LVRT) are among these serious issues. Frequency Regulation has gained significant attention in the literature in Recent years [4]–[6], and grid codes for LVRT have been standardized And implemented in several countries [7].

Generally, LVRT standards emphasize the need to keep a wind power generator connected to the grid and to improve the voltage profile during low-voltage transients. Reference [8] shows that all the generators in a wind farm are not required to provide LVRT capability; however, this reference does not question the need to implement LVRT implementation in wind power generators. The performance of a doubly-fed induction generator (DFIG), as the most popular type of wind generator, has been extensively studied under LVRT [9]. Although the crowbar method is widely utilized in DFIGs, it is characterized by the loss of control and the waste of energy [10]. As an alternative, the demagnetizing control method has been proposed; however, it has not been widely adopted due to its complexity.

All these difficulties, besides some other problems, such as reliability, losses, and the cost of slip rings and gearboxes, reduce the advantages of DFIGs and result in an increasing trend toward using direct-drive permanent-magnet synchronous generators (PMSG) with full-scale back-to-back converters. The objectives of

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POWER CONTROLLABILITY OF A THREE-PHASE CONVERTER WITH AN UNBALANCED AC SOURCE

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Abstract—**Three-phase dc–ac power converters suffer from power oscillation and over current problems in case of the unbalanced ac source voltage that can be caused by grid/generator faults. Existing solutions to handle these problems are properly selecting and controlling the positive- and negative-sequence currents. In this paper, a new series of control strategies which utilize the zero sequence components are proposed to enhance the power control ability under this adverse condition. It is concluded that by introducing proper zero-sequence current controls and corresponding circuit configurations, the power converter can enable more flexible control targets, achieving better performances in the delivered power and the load current when suffering from the unbalanced ac voltage.**

Index Terms—Control strategy, dc–ac converter, fault tolerance, unbalanced ac source.

I. INTRODUCTION

I N many important applications for power electronics such as renewable energy generation, motor drives, power quality, and micro grid, etc., the three-phase dc–ac converters are critical components as the power flow interface of dc and ac electrical systems [1], [2]. As shown in Fig. 1, a dc–ac voltage source converter with a corresponding filter is typically used to convert the energy between the dc bus and the three-phase ac sources, which could be the power grid, generation units, or the electric machines depending on the applications and controls [3]–[5]. Since the power electronics are getting so widely used and becoming essential in the energy conversion technology, the failures or shutting down of these backbone dc–ac converters may result in serious problems and cost. It is becoming a need in many applications that the power converters should be reliable to withstand some faults or disturbances in order to ensure certain availability of the energy supply. A good example can be seen in the wind power application, where both the total installed capacity and individual capacity of the power conversion system are relatively high. The sudden disconnection of the power converter may cause significant impacts on the grid stability and also on the high cost for maintenance/repair [1]. As a result, transmission system operators (TSOs) in different countries have been issuing strict requirements for the wind turbine behaviour under grid faults. As shown in Fig. 2, the wind power converter should be connected (or even keep generating power) under various grid voltage dips for certain time according to the dip severity, and in some uncritical conditions (e.g., 90% voltage dip), the power converter may need long-time operation.

When the ac source shown in Fig. 1 becomes distorted under faults or disturbances, the unbalanced ac voltages have been proven to be one of the greatest challenges for the control of the dc–ac converter in order to keep them normally operating and connected to the ac source. Special control methods which can regulate both the positive- and negative sequence currents have been introduced to handle these problems. However, the resulting

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MODELING AND SIMULATION OF A NOVEL SOLAR PV/ BATTERY HYBRID ENERGY SYSTEM WITH A SINGLE PHASE FIVE LEVEL INVERTER

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Abstract - In current global energy scenario, renewable energy sources can play an important role in meeting the ever increasing energy demand. This is due to exhaustive nature of fossil fuels and the environmental pollution caused by other conventional energy sources. Among renewable energy sources, solar photo-voltaic system is the most popular one as solar energy is available in abundance without paying any cost. The output voltage generated from the solar panels depends on solar irradiance level and temperature. This paper intends to present a novel solar PV/battery hybrid energy system with a single phase five level inverter. The battery is used as a backup source when in case solar power is absent. The power flow through the battery is controlled using a bidirectional converter so that the optimum usage of the battery is ensured. The proposed configuration uses a modified single phase five level inverter topology for converting DC voltage generated from solar photovoltaic/battery energy sources to AC voltage for feeding to the load. The usage of five level inverter reduces Total Harmonic Distortion (THD) in output voltage and thus eliminates the use of bulk filters at the output side. Simulation study of the proposed system is carried out using MATLAB Simulink. Simulation results for different cases are provided in this paper.

Keywords—photovoltaic system; renewable energy; multilevel inverter; hybrid energy system; bidirectional converter

I. INTRODUCTION

Nowadays renewable energy generation systems are gaining more attraction due to the exhaustive nature of fossil fuel resources and its increased prices. Also the need for pollution free green energy has created a keen interest towards alternate energy sources. Solar power is the most common and available renewable power source to meet our rapidly increasing energy requirements [1].

Peak power from the solar pv maodule is to be tracked for its efficient implementation. Various algorithms are available in the literature for tracking maximum power from solar panels. In this paper Perturbation and Observation algorithm is considered due to its simplicity. A boost converter is used to implement maximum power point tracking algorithm [2].

The output power generated from the solar panels is intermittent in nature and varies with the irradiance level. Hence to make the system more reliable, a battery is included
in the system. A bidirectional converter is also used to adjust the flow of power from and into the battery [3].

A five level inverter is used to convert the dc voltage from the solar pv array to ac voltage and connect feed to the load. In this paper a novel topology for single phase five level inverter is suggested [4]. This topology uses reduced number of switches compared to conventional five level inverter topologies. Multilevel inverters produce a desired output voltage from different levels of direct current voltages as inputs. As the number of levels increases, the synthesized output waveform is staircase wave which approximates a sine wave with more number of steps.

DECOUPLED ACTIVE AND REACTIVE POWER CONTROL FOR LARGE-SCALE GRID-CONNECTED PHOTOVOLTAIC SYSTEMS USING CASCADED MODULAR MULTILEVEL CONVERTERS

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Abstract:-This paper presents a robust PI controller design for a three-phase grid-connected photovoltaic (PV) system to control the Active and Reactive power flow in the grid and the dc-link voltage for extracting maximum power from PV units by using a Cascaded multilevel converter. However, power distribution and control in the cascaded PV system faces tough challenge on output voltage over modulation when considering the varied and non-uniform solar energy on segmented PV arrays. This paper addresses this issue and proposes a decoupled active and reactive power control strategy to enhance system operation performance. The relationship between output voltage components of each module and power generation is analyzed with the help of a newly derived vector diagram by using a PI which illustrates the proposed power distribution principle. Finally, a 3-MW, 12-kV PV system with the proposed control strategy is modeled and simulated in MATLAB/Simulink software and the performance also analyzed by using both controllers.

I.INTRODUCTION

In response to global concerns regarding the generation and delivery of electrical power, photovoltaic (PV) technologies are gaining popularity as a way of maintaining and improving living standards without harming the environment. To extract maximum power from the PV system [1], a robust controller is required to ensure maximum power-point tracking (MPPT) [1]–[3] and deliver it to the grid through the use of an inverter [4]–[6]. Robustness is essential since the power output of PV units varies with changes in atmospheric conditions. Thus, the controller must be robust enough to provide a tighter switching scheme for the inverter to transfer maximum power into the grid over a wide range of operating conditions with a short transient period. In a grid-connected PV system, control objectives are met by using a pulse-width modulation (PWM) scheme based on two cascaded control loops [7]. The two cascaded control loops consist of an outer voltage-control loop to track the maximum power point (MPP) and an inner current control loop to control the duty ratio for the generation of a sinusoidal output current which needs to be in phase with the grid voltage for unity power factor operation [7].

A 80-KW ISOLATED DC–DC CONVERTER FOR RAILWAY APPLICATIONS

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Abstract—This paper provides an analysis of a three-phase dual active bridge (DAB) topology used as high-power-density dc–dc converter for railway applications. The three-phase DAB is analyzed concerning the current intervals, the output power, and soft switching region, including the impact of zero-voltage switching capacitors. Furthermore, two measures are proposed to achieve soft-switching in the entire operating range, being auxiliary inductors and a straightforward switching strategy called the burst mode. Optimal component values are calculated to minimize losses in the complete operating range and to assess which measure is best suited. A prototype with the specifications acquired from the application has been built, yielding an efficiency of 95.6% at a nominal output power of 80 kW.

Index Terms—DC–DC power conversion, power electronics, power supplies, rail transportation electronics.

I. INTRODUCTION

Since the electrification of rail transportation systems, the amount of additional electrical systems in the vehicle has been increasing substantially. These, so called "auxiliary systems" are all systems on a rail vehicle that have functions other than traction. Nowadays, many auxiliary systems are present on rail vehicles. Examples are lighting, compressors, pumps, air-conditioning, and passenger information systems. In order to provide energy to these auxiliary systems, an auxiliary power unit (APU) converts the voltage from the overhead line or a third rail to the required levels of supply voltages. The total auxiliary power demand is typically in the range of tens of kilowatts up to a few hundreds of kilowatts. For safety reasons, galvanic isolation between the input and the output of the APU is required. In conventional APUs, the galvanic isolation is often realized with low-frequency transformers, an example is shown in Fig. 1(a). These transformers are bulky and result in relatively large and heavy APUs. Especially for light rail vehicles, like trams and metros, this becomes a problem when the auxiliary power demand increases. Therefore, size and weight reduction of the APU is necessary to meet the auxiliary power demand within the capabilities of light rail vehicles.

Most of the light rail transport systems are using a dc electrification system with common nominal voltages of 600 or 750V.

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MODULAR MEDIUM-VOLTAGE GRID CONNECTION CONVERTER WITH IMPROVED SWITCHING TECHNIQUES FOR SOLAR PHOTOVOLTAIC SYSTEMS

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Abstract: The photovoltaic cells are used in solar systems which are designed in high-frequency components. As high-frequency components are run faster (frequency is inversely proportional to the time (fα1/t)). Solar photovoltaic made up of amorphous material amorphous materials are similar to metallic glasses are metallic materials that have a non-crystalline structure most amorphous metals are alloys rather than pure metals these materials have atoms of varying sizes in random arrangement in the solid they exhibit a high viscosity in molten form which prevents proper molecular alignment, giving them better resistance to plastic deformation. The magnetic-link which made by amorphous material common magnetic link can almost maintain identical voltages at the secondary terminals. The magnetic link which made up of magnetic but this magnetic material suffer from an effect of leakage reactance or leakage inductance. Leakage inductance is an inductance an inductive component present in a magnetic link results from the imperfect magnetic linking high voltage and low voltage sides. whatever magnetic flux that does not link the high voltage side to low voltage side acts as leakage inductance is the main challenging issue. In this consider, a new concept of identical modular magnetic links is proposed for high power transmission and isolation between high voltage side and low voltage side.

Index Terms—Loss estimation, modular magnetic link, modular medium-voltage converter, new modulation techniques, solar photovoltaic (PV) power plants.

I. INTRODUCTION

With the rapid development of large-scale solar photovoltaic cells(PV) plant. A photovoltaic power station also was known as a solar park, is massive photovoltaic s/s designed for the supply of merchant power.
The sun deports its energy to us in two primary forms: heat and light. There are two master types of solar power systems, videlicet, solar thermal systems that bunker heat to warm up water, and solar PV systems that convert sunlight directly into electricity as shown in +Figure 1.

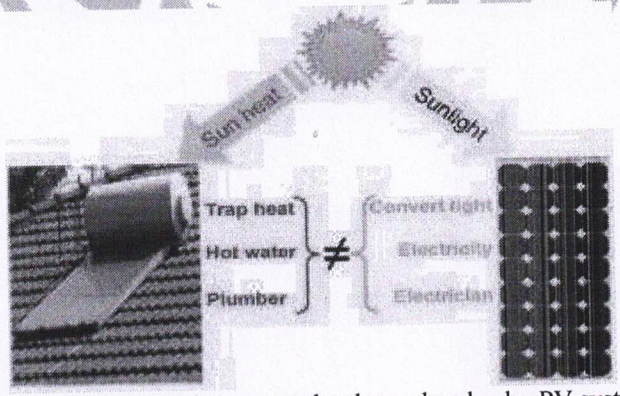

Fig 1. The difference between solar thermal and solar PV systems

When the PV faculties are exposed to sunlight, they give direct current ("DC") Electricity. An inverter then changes the DC into alternating current ("AC") electricity, so that it can course into one of the building's AC dispersion boards ("ACDB") without impressing the quality of power supply. PV cell plant sometimes also referred as solar forms or solar ranches especially when sited in agricultural areas. The medium voltage PV converter which enables solar PV power systems to be connected directly to the medium & high voltage lines, without using heavy weight and large size line filters boosters and step up transforms has become realistic. Booster is the one which is steps up the voltage from its input to its output boosters were made in assorted configurations to suit different applications.

1.1. Types of Solar PV System

Solar PV systems can be separated based on the end-use covering of the technology.

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