Design and Evaluation of FLC-Based Speed Control for a Dual-Induction Motor System Powered by a Five-Leg Inverter

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ABSTRACT: The dual three-phase induction motor system utilized in industrial production processes is driven by a five-leg voltage source inverter (FLVSI), and in this work we suggested an enhanced speed control based on FLC. Two controllers make up the sophisticated speed control method: 1) The first is a slip controller that meets the application's need, which is to regulate two motors' mechanical speeds equally under all load conditions. 2) The second is an angle controller that meets the FLVSI requirement, which is to regulate the phase angle difference between the two motors in order to minimize the common leg current. Depending on the dual motor's operating conditions, the common leg current may be twice as high as the current in the other leg. The two controllers' stability under advanced speed control is examined, and the simulation results demonstrate the advanced speed control's overall effectiveness for the FLVSI-fed dual-motor drive system.

KEYWORDS: FLC CONTROLLER, FLVSI, Stability, Slip.

I.INTRODUCTION:

HIGH efficiency, high performance, and low cost ac motor drive systems are required in many industrial applications. An induction motor (IM) drive system, along with low cost and robustness, is mainly used in various industrial applications. Many industrial manufacturing processes in the textile, paper, and steel industries require numerous electric machines [1]–[4]. Over the past decade, dual-motor drive systems have received considerable attention for reducing the size, number of devices, and losses of the inverters. For driving the dual motor system, different topologies of the voltage source inverter have been investigated [5]–[7], such as the mono-inverter dual-parallel system [8], the four-leg inverter system [9], the five-leg inverter system, and the nine-switch inverter system [10]. These topologies with a reduced number of switching devices can reduce the capital cost and the volume of the whole system. They can also provide the reduction of switching losses, which improves the efficiency of the motor drive system.

A five-leg voltage source inverter (FLVSI), which is a type of a dual-motor drive system, can save two switches compared with two three-leg voltage source inverters (TLVSI). Many control methods have been proposed for the FLVSI dual-motor drive system such as the two-arm modulation method [11], [12], the double-zero sequence (DZS) method, space vector modulation method [13], direct torque control method [14], and hysteresis control method [15]. These control methods allow two motors to independently control and improve the voltage utilization factor [16].

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A novel approach of a Modified DCPET Based on Series Connection of Full-Bridge Converters

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ABSTRACT: In this study, we present a unique dc power electronic transformer (DCPET) architecture for isolated medium-voltage and high power applications, such as dc distribution grid, locomotive, and ac/dc hybrid grid. In comparison to traditional approaches, our suggested framework—which consists of high-frequency isolation transformers and less power semiconductors—will reveal cost savings and compact size, which can enhance stability and dependability. In the event that some dc-dc converters malfunction, fault handling or redundancy plans can be implemented to further improve reliability. Additionally, input voltage sharing might be misused to improve stability and simplify the control system. Soft switching is currently guaranteed for all switches, which is beneficial for increasing power density and switching frequency. The principle, evolution, and control of the anticipated DCPET are all accessible and thoroughly examined in this study. In conclusion, MATLAB/SIMILINK is used to create a simulation of the suggested DCPET.

KEYWORDS: Dc power electronic transformer (DCPET), Locomotive, Microgrid, Distribution grid.

I.INTRODUCTION: Based on power electronics technology, POWER electronic transformers (PETs), also known as solid state transformers, are a type of power conversion device that exhibits high frequency, bidirectional power flow, and electrical isolation [1]–[5]. Ac/dc hybrid grids [6]–[8], dc distribution grids [9]–[11], new locomotive traction converters, commonly known as power electronic traction transformers (PETTs) [12]–[14], and other medium-voltage and high-power applications have all made extensive use of PET in recent years. Ac–ac, dc–dc, ac–dc–dc, and ac–dc–dc–ac are some of the several cascaded configurations of PET that are determined by the various power conversion requirements. Other PET cascaded topologies, with the exception of ac–ac structures, typically have a dc–dc stage. The dc–dc stage, which can be thought of as the heart of PET, is utilized to accomplish dc voltage conversion, bidirectional power flow, high frequency, and electrical isolation. Thus, DCPET is another name for the dc–dc stage of PET. For instance, a DCPET is needed to accomplish the power conversion between medium voltage dc (MVdc) and low voltage dc (LVdc) buses in a contemporary dc distribution grid. A typical structure diagram of the DCPET-based dc distribution grid is shown in Fig. 1.

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POWER QUALITY ENAHNCEMENT IN A THREE-PHASE FOUR WIRE TRANSMISSION SYSTEMBY DVR USING FLC FOR VOLTAGE SAGS

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Abstract: Electricity is being improved daily, and in the near future, distributed generation (DG) is anticipated to be included in the transmission system without lowering power quality.With routine limits, a large number of static stabilizing devices ensure power stability. This research is one of its kind in effectively maintaining the quality of the power system (PS) by exploring several power injection topologies for active and reactive power adjustment. A design for peak control of constant current that uses fuzzy logic and natural reference to regulate the constant current using Pavg methods for 3-phase, 4-wire grid-tied inverters. In comparison to static simulations for grid requirements, the technical liability and efficiency of the investigated methodology's structure and deployment are assessed in dynamic computational analysis.

Index Terms: distributed generations, power factorcorrection, three-phaseinverter, dynamic voltage restorer, fuzzy logic control.

I. INTRODUCTION

The scientific development in the area of power electronics[1] had greatly diminished the price value of photovoltaic cells and deployment of feed in tariff strategies[2] in many nations have guided for large spread usage of DGs where the it directly impacts the efficiency of grid frameworks. In order to cancel out the negative impacts of the DGs on power system framework it must be encountered with well-designed regulation frameworks that are able to sink with the existing Power system.In the power system network when the DGs sink and operate with the normal power-voltage situations the PS responds with (Unity Power factor) UPF operating at optimum power. In contrast it DGs behave abnormally, sinking off inefficiently with PS network. So DGs disconnect automatically/manually which is coined as anti-islanding[3] protection scheme. In any case of deeper analysis, on the start of fault in the grid the cascade down of all DGs shall generate numerous adverse effects making the system to collapse after a series of voltage flicker, power outage and power fluctuation events.

So in order to counter these events in power system, some nations have deployed low/medium level voltage operations in grid codes[4,9] to maintain DGs work more actively to administer active(P)and reactive(Q)power changes in reaction to voltage and frequency fluctuations and also low fault ride through(FRT) capability. Low FRT's action is to make the DG in connection with grid through up and down of voltage events and also make sure to provide

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A NOVEL ANN BASED SOLAR FED 15-LEVEL MULTI LEVEL INVERTER TO IMPROVE POWER QUALITY

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ABSTRACT: Power quality deterioration is caused by harmonics in the photovoltaic (PV) energy conversion device. This study aims to investigate the harmonic eliminations in a Solar Fed cascaded fifteen stage inverter using Proportional Integral (PI) controllers, Artificial Neural Networks (ANN), and Fuzzy Logic (FL). The FLC solution, in contrast to other methods, aids in minimizing harmonic disturbances with the goal of increasing power efficiency. This article also suggested an improvement in power efficiency to maintain voltage and frequency at the inverter output end in accordance with grid link criteria. MATLAB/Simulink simulations of solar-fed cascaded 15-Level inverters using PI, ANN, and FL-based controllers. To illustrate the suggested method, a photovoltaic plant with a multi-level inverter has been created in Simlink. The output voltage control and simulation are the three techniques used to measure power efficiency metrics.

KEYWORDS: Harmonics, Artificial Neural Network (ANN), Fuzzy Logic (FL), Proportional Integral (PI).

I.INTRODUCTION: Providing access to electricity in rural areas is an essential condition in order to improve the health standards of living that are a top priority for many developed countries [1]. [2]. [3]. The most significant subjects of study in society are energy conservation, power availability and biodiversity. Sustainable, clean, economic, stable and safe energy is a key prerequisite for a country's economic growth, human and industrial development. The importance of effective energy usage has increased by environmental considerations, the exhaustion of petroleum supplies and an increase in the dependence on fossil fuels from insecure locations. Sources such as thermal nuclear energy used for some period now have their own advantages and demerits in generating electricity. The increasing focus on reducing the carbon footprint (CO2) has contributed to the growing interest in research into non-fossil fuels as an energy source. This requires a more efficient supply of energy in all fields, such as domestic, transport, manufacturing and agricultural. This unexpected environmental pressure and difficulty has led electricity suppliers to better improve and efficiently change the energy grid. The decreased uncertainty of various energy policies has been shown in recent times and global investment opportunities in the energy market have been increased [5]. The life of renewable energy from infinite natural resources can be termed. Natural renewable such as solar power, water, climate, biomass and geothermal heat are available for several

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ABSTRACT: This study presents a novel method for controlling the power flow of connected AC-DC microgrids in grid-connected hybrid microgrids that is entirely dependent on implementing a modified unified interphase power controller (UIPC). The device under study is a typical grid-related hybrid microgrid that consists of one AC microgrid and one DC microgrid. These microgrids are connected using a modified UIPC in place of parallel-connected power converters. This paper's main contribution is the modification of the conventional UIPC design, which employs three power converters per segment, to enable the employment of a reduced range of energy converters for power trade control across AC-DC microgrids. Each segment of the modified form has a single power converter, known as a line power converter (LPC), and an energy converter, known as a bus energy converter (BPC), which controls the DC bus voltage. Through the LPCs, whose DC buses are connected to the AC microgrid, it is connected to the main grid and operates in either capacitance mode (CM) or inductance mode (IM). The LPCs' manage structure makes use of a fuzzy logic controller. In order to minimize errors in the layout of club functions, the fuzzy inference system is mainly improved using the H∞ filtering technique. The DC microgrid provides the LPCs' DC voltage through the BPC. However, the DC hyperlink voltage of the LPCs fluctuates because the DC microgrid voltage is provided here with the help of a PV device. Therefore, a new nonlinear disturbance observer based sturdy more than one-surface sliding mode control (NDO-MS-SMC) approach is presented for DC facet manipulation of the BPC as the second contribution to stabilize the DC link fluctuations. The results of the simulation validate the efficacy of the suggested technique for controlling power drift in the enhanced UIPC for hybrid microgrids. The effectiveness of the suggested power flow control approach of the enhanced UIPC for hybrid microgrids is validated by the simulation results.

KEYWORDS: UIPC, fuzzy inference system, disturbance observer based robust multiple-surface sliding mode control (NDO-MS-SMC), line power converter (LPC), bus power converter (BPC).

I.INTRODUCTION:

DC power resources, including photovoltaic (PV) systems, fuel cells (FCs), energy storage systems (ESSs), and recently developed DC loads, including programmable DC electronic loads, have infiltrated traditional power systems through DC microgrids within the last 10 years [1]. Conversely, AC microgrids can be used to

Design and Simulation of Power Flow between AC-DC Microgrids by using Modified UIPC

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IOT-Based Real-Time Failure Alert System for Distribution Transformer

MITTAKANTI VINOD KUMAR[1], PRODDUTURI SAICHAND[2], Y RAVINDER[3]

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ABSTRACT

By overcoming the drawbacks of sporadic human monitoring, the system seeks to offer distribution transformers continuous monitoring and safety. IoT technology allows for remote monitoring of a number of parameters without the need for human interaction, including temperature, oil level, current, voltage, short circuit, overvoltage, overcurrent, and even copper theft. This system's quick detection of any critical circumstances reduces the chance of transformer failure or malfunction. When such circumstances arise, the system notifies operators via SMS notifications that are transmitted to them using Internet of Things modems. For quick visibility and action, fault conditions are also shown immediately on an LCD panel. By putting this technology in place, distribution transformer uptime and dependability can be greatly increased, which lowers the possibility of unplanned power outages brought on by transformer failures.

Keywords: ESP 32, Voltage Sensor, Current Sensor, Oil Level Sensor, Relay, Lamp.

I.INTRODUCTION

Transformers are essential parts of the power system that regulate voltage, which is necessary to provide customers with continuous electricity. Traditional monitoring techniques, which depend on manual inspections, are laborious and do not have the ability to detect faults in real time. Advanced sequential monitoring systems that make use of IoT technology are suggested as a solution to this problem. These systems allow transformer operations to be continuously monitored, allowing for the real-time detection of fluctuations and problems. Human intervention is decreased and monitoring becomes more precise and effective when manual inspections are no longer necessary. Additionally, the use of Android applications improves monitoring capabilities by giving operators access to real-time data visualization and enabling prompt resolution of any errors found. All things considered, these developments help power networks operate more reliably and efficiently, guaranteeing consumers a steady supply of electricity.

II. LITERATURE SURVEY

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II. LITERATURE SURVEY

VEHICLE THEFTING DETECTION BY USING IOT

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ABSTRACT

In order to prevent car theft in parking lots and occasionally when driving in unsafe areas, the strengthening of vehicle technology systems is gaining more study popularity and including a vehicle theft security system. The necessity for security is growing everywhere in our evolving world as scientific researchers unveil new eras of discoveries and technology advances daily. Currently, driving is a vital practice for the general public. At the same time, protecting the car from theft is equally crucial. No more input or preferences may be available to assist the vehicle's owner in recovering their vehicle once it has been filched. This method's primary goal is to locate the car without unwanted access by employing quick, simple, obvious, dependable, and affordable methods. In addition to providing surveillance and improved robbery control through profile recognition, the innovative technology will alert the vehicle holder and shock any unauthorized individuals attempting to use the car.

I.OBJECTIVE OF THE PROJECT

In the current state of affairs, women are keeping up with men in all spheres of life, but regrettably at the expense of being abused, harassed, and violently attacked in public and even in their own homes. They are unable to leave their houses at any time of day, are unable to dress however they like, and will not even choose to live in peace. Girls are subjected to a certain amount of quiet inhibition that not only robs them of their independence but also crushes their goals and confidence. It is clear that there is a need for women's security in the nation because of the aforementioned factors. It is worth noting, though, that technological advancements have opened the way for them in most spheres of life. As such, it has the ability to demonstrate intelligence by using the benefits of modern technology to address issues that affect social groups. Therefore, the goal of this project is to employ the web of things (IOT), a technological trend, to help women stop living worry-filled lives. The Internet of Things (IOT) is a network of physically connected things that can be accessed online. It refers to the ever-growing network

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