Study and Analysis of Modular Multilevel Converter for Electric Vehicle Charging System

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ABSTRACT

In this article, the function of the modular multilevel converter (MMC) electric field systems (EV) is monitored. The first proposed Modular Multilevel Converter (MMC) has become a competition for high voltage direct current (HVDC) and high power motor drive applications, for this reason, Advantages such as high modularity, error handling capability, and similar, High-Quality Output Waveforms. The function of integrating motor drive capability, cell state-of-charge equalizer (SOC), an on-board charger, in single circuit topology, makes MMC for EV attract application attention. In the MMC, due to the interaction between current and switching operation, specific low-order current-ready harmonics are generated and flow through the battery cells.

KEYWORDS-Modular Multilevel Converter; battery storage system; electric vehicle:

1 INTRODUCTION

This study revolves around the modular multi-functional multi-step electrical power conversion system, which can provide only one motor for operation, as well as AC and DC battery charging functions. To illustrate the home set system, the operation and control mechanisms are thoroughly evaluated, including the state of charge balance (SOC) control device in driving mode, DC or AC charging systems in inverter charging mode. Interest in electric vehicle (EV) technologies is growing rapidly due to reduced fuel consumption and greenhouse gas emissions. For better integration with batteries inside the EV, a variety of standalone switching systems are installed for DC speed charging, AC charging, car driving, power supply, and battery management functions. To reduce hardware hardness, AC charging and car driving functions have been included.

This work presents a multifunctional modular multilevel conversion system for electrical energy. Practices and controls are fully evaluated. This includes the Cargo System Management System (SOC) in drive mode [1]. The use of the multilevel converter module v (MMC) in vehicular electronic systems (EV)

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has been studied over the years as an emerging case study due to some advantages such as is advanced modular Ability to tolerate advanced output type errors and the ability to integrate the functions of driving a car Built-in charger and cell equivalent Thus, the real dynamics of AC power from MMC applications reduces battery density and damage to battery life [2].

This research presents a comparative analysis of modular multivariate converters using multi modulation modes. Total harmonic distortion (THD) analysis was performed by phase-distributed pulse-width modulation (PD-PWM) and the opposite of pulse-width phase-width modulation. This study shows that the POD-PWM v technique has more harmonious efficiency and responds well. This indicates that the THD carrier is better than the frequency. All results were analyzed and validated with the help of Matlab/Simulink [3]. The multilevel converter module (MMC) for electronic motor applications has been studied in recent years due to its advantages such as high modularity. Tolerance capability, Therefore, during MMC operation, a dedicated AC monitor is introduced into the battery cell wave. Helps Reduce Battery Life This article introduces the standard multi-mode injection control module. This increases the volume of the 2nd harmonic current and allows filtering with a smaller filter [4].

Open-chain failure of multiple bipolar insulated ports (IGBT) affects the reliable performance of v-module converters (MMCs). This article presents diagnostic strategies for the management of this condition. Detecting and evaluating the wrong submodule number (SM) is done by checking the wrong signature value [5]. The work proposes a new modified capacitor converter (SCC) main cell (BC). As a result, the general structure of the proposed DCC was developed. Designed, more current switches, drivers, diodes, capacitors, and conductor switches are needed in the current flow path and capacitor v charge path. A multilevel switching capacitor inverter (SCMLI) was then developed using two common SCC symbols. Furthermore, the proposed SCMLI cascade extension is performed and analyzed for symmetric and asymmetric DC source configurations [6].

Multi-Level Inverters (MLIs) have been extensively studied in the past for various low, medium, and high resistance applications. Improving power quality is a key factor in the tremendous growth and demand for MLI in low voltage, stress, better performance, and high modulus high-frequency AC distribution in the electric vehicle industry. and production of renewable energy [7]. Solar thermal power generation or largescale power supply: There is a need for advanced electronic systems in the world. The new multilevel module (M2C) converter concept offers superior features for these applications. The operation of the HVDC system is described and approved based on new requirements, including troubleshooting in multi-terminal HVDC networks. A pulse width modulation (PWM) method for a multi-module converter (MMC) using a single cell. This method can produce the highest output voltage of 2N + 1 (where N is the number of modules in the upper or lower arm of the MMC) [8] [9].

2 VOLTAGE-SOURCES CONVERTER

As thyristors (and mercury makers) can only be turned on (not turned off) by controlling the action and relying on an external AC system to carry out the extinguishing system, the control system has only one degree of freedom if it is in - Reset thyristor curve. This limits the usefulness of HVDC in some cases because it means that the AC system for which the HVDC converter must always have synchronous devices to provide time to switch power; the HVDC converter cannot provide an automatic system. This is not a problem to supply additional power to the grid that is already working but cannot be used as an independent source.

3 MULTILEVEL MODULAR CONVERTER (MMC)

Similar to the 2-stage switch and the 6-stage line switch, the MMC has 6 valves, each of which connects the AC connector to the DC connector. Connected in series, each MMC valve automatically controls the power supply in its original state. Each MMC tube has several switching sub-modules. Each lamp has its capacitor. In a General Half-Bridge Difference Circuit Each sub-module has two GBI connected in series with crossover capacitors. There is a connection point in the middle and one of the two capacitor terminals adopted as an external connection.

4 MMC VARIANTS

This involves combining several consecutive ITIs on each of the two switches that make up a submodule. This provides an output voltage waveform with fewer steps than a standard MMC system. This system is known as a two-stage cascade transformer (CTL). It's similar to a standard half-bridge MMC in every way except the effects. But it is still considered good enough to avoid the need for filtering in most cases.

5 METHODOLOGY

Different types of power converters are built automatically for fast charging, AC charging, motor power, voltage, and circuit breakers to best suit EV batteries. AC charging and self-driving functions have been included to reduce hardware hardness. A modular device can reduce the amount of battery selected to increase battery life. In particular, the inverter is accepted as a switch between the batteries and the car. Due to the lack of conventional DC connectivity, cascade inverter batteries cannot freely transfer their power to balance battery conditions.

6 SIMULATIONS

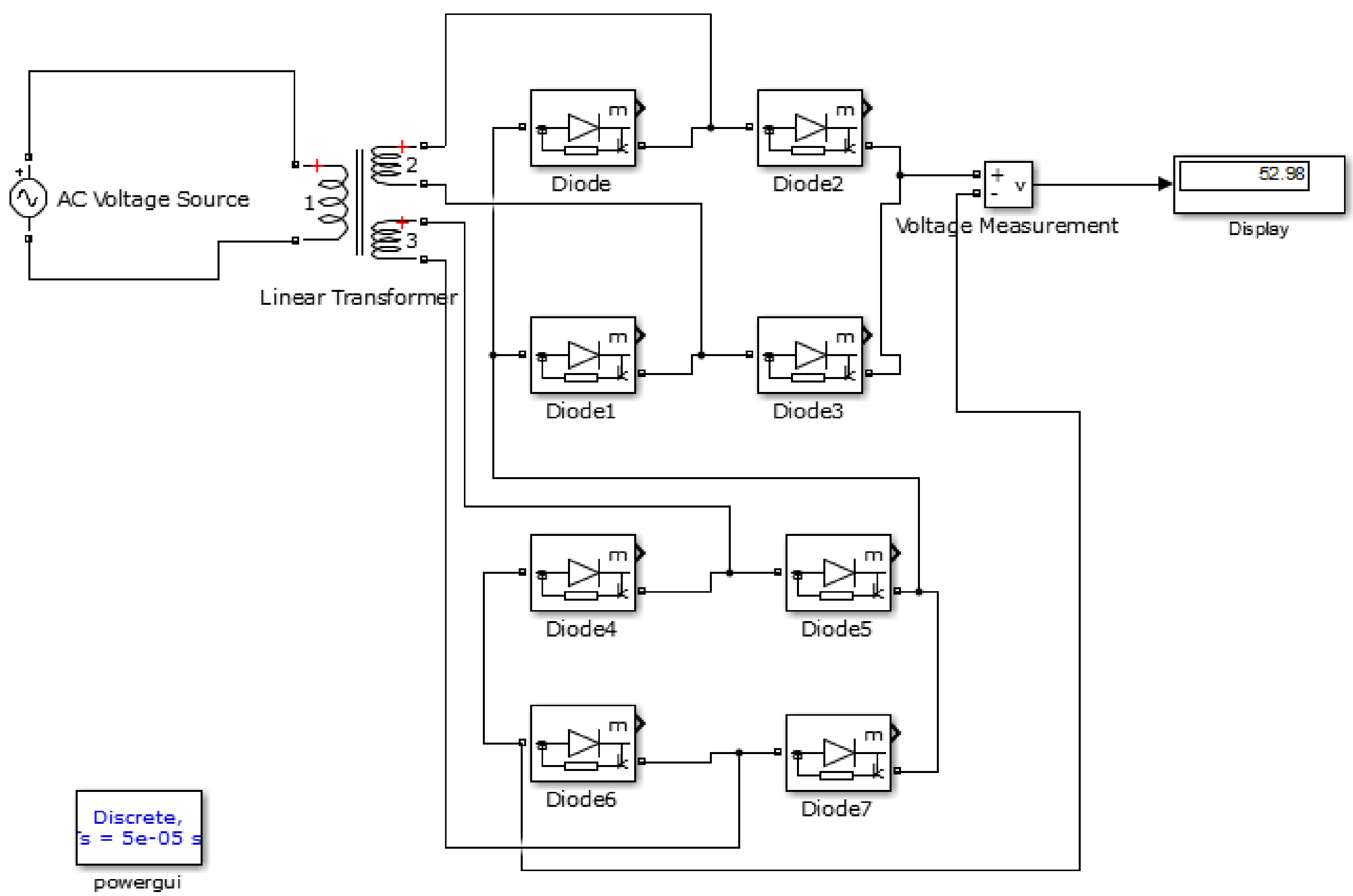

Figure 1 Single-phase transformer model

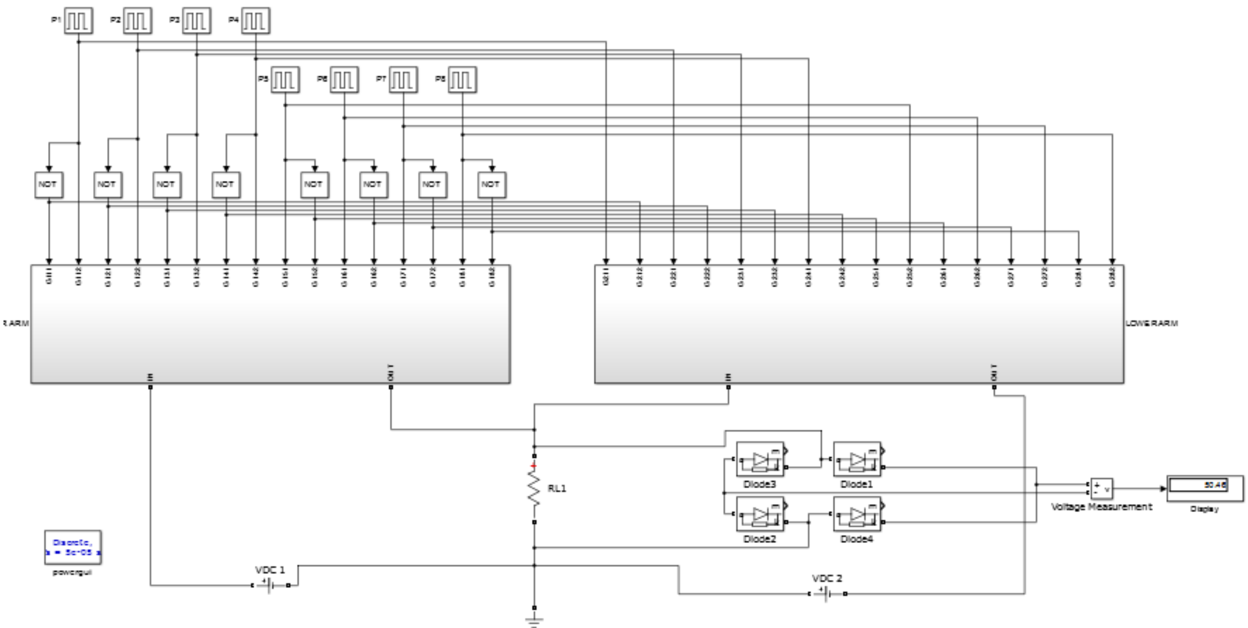

Figure 2 Modular Multi-Level Converter model

7 CONCLUSIONS

The converter will work in two separate modes; this method may be suitable for low power applications, one method to improve this is to use every half cycle of the input voltage instead of every alternate half cycle. The circuit that allows us to do this is called a full-wave rectifier. The single-phase transformer and multi-level modular converter model were developed in MATLAB / SIMULINK. The input of the single-phase transformer model and the multi-level modular converter model was 220 VAC and 52 VDC for both VDC1 and VDC2 inputs, respectively. The output of the single-phase transformer model and the modular multilevel converter model was 52.98 VDC and 52.46 VDC, respectively.

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