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A Review Article on Harmonic Removal in Polyphase Inverters using Modified Biomimetic Algorithms

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ABSTRACT:

With its multi-level structure, multi-level inverters can achieve better energy efficiency and higher energy costs. They deal with the power industry and are best for reactive power compensation. Multilevel voltage source inverters can operate at high voltages with less electromagnetic interference and higher efficiency. Harmonic removal is important in multilevel voltage source inverters and many tuning techniques can be applied to the inverter to eliminate harmonics. Among these tuning methods, selected harmonic cancellation PWM is an important tuning strategy that can be used to obtain undervoltage decision for the output voltage waveform of the multistage inverter.

This article examines various optimization techniques used in the SHEPWM process. The comparative performance of optimization methods in SHEPWM is discussed.

I. Introduction:

Multilevel voltage source inverters are very important to the electrical industry due to the need to increase the power level. The multilevel version of this inverter is able to control the voltage range of kilovolts and megawatts [1]. Compared with two-phase inverters, the advantages of multi-phase inverters are higher performance, less electrical interference and switching, no electrical problems equivalent to

switching equipment, power power close to 1, high performance and better power. They eliminate the need for step-up transformers in the circuit and are suitable for reactive power charging. The rated output voltage and the rated output voltage of the multi-phase inverter increase with the phase.

The increase in voltage level adds a single phase transformer [2]. The

multilevel inverter has many applications due to its advantages in increasing power levels. They find application in electronic equipment, medium voltage drives, power distribution equipment and AC transmission equipment. They are widely used in adjustable speed drives to reduce electromagnetic interference and prevent motor failure from high switching frequency voltages [2, 4]. It is important to eliminate the harmonics in the output voltage of the

multi-voltage circuit, and there are many conversion strategies to eliminate the harmonics in the variable frequency of the inverter.

Differentiation or optimization techniques are used for transformation strategies to solve the unbalanced equations created by these transformation strategies. This article examines the optional harmonic cancel PWM input.

II. Types of MLI:

The multilevel inverter model is used to generate a sinusoidal AC voltage waveform from the multilevel DC voltage. As the voltage level increases, the output voltage waveform has more steps and takes the step voltage waveform. In the last few years, various multilevel inverter topologies have been introduced.

The flying capacitor (capacitor clamp) multilevel inverter was proposed by Meynard and Foch in 1992. The layout of the fast capacitor inverter is similar to the diode clamp except that clamp capacitors are used instead of diodes. This inverter topology has a ladder-like DC capacitor arrangement where the voltage of each capacitor is different from the others. The energy gain of adjacent capacitor legs gives the output voltage step. Figure 3 shows a three phase to phase flying capacitor multilevel inverter.

An m-phase inverter (m-1) requires a capacitor. One application of flying capacitor inverters is static variable charging. The advantages of floating capacitor multilevel inverters are: control of active and reactive energy flows, redundancy of connections for equal voltage, and a large number of capacitors to provide capacitance at the output. The disadvantage of these inverters is that they need a lot of capacitors when there is a power outage. There are many stages, the loop is large and the cost is high, the control method of the inverter is difficult, the frequency variation and the variation of the actual power transmission cost are high, which makes the performance poor [3].

III. Harmonics reduction:

An important requirement is to reduce harmonics in the output voltage waveform of a multilayer voltage source inverter. Different techniques can be used in multilevel inverters to eliminate harmonics. This optimization technique can be combined with various optimization methods to solve transcendental nonlinear equations. According to the multilayer voltage of the inverter changeover frequency, the changeover pattern can be divided into two types. I.

Classic carrier-based sinusoidal PWM ii. Multi Carrier Pulse Width Modulation - Phase Configuration (PD) PWM thiab Phase Inversion Configuration

IV. Algorithm for H. reduction:

Imperialist Competition Algorithm This global research method is used for many optimization problems. It is better in terms of convergence speed and creating a global solution [13]. In [14], ICA is used to meet expected values while minimizing compromise. Then compare PSO, Genetic Algorithm and ICA. The results show that ICA outperforms and is faster than GA.

Compared to PSO, ICA is easier to implement and more likely to achieve a global solution. PSO is three to four times faster than ICA**.**

V. Conclusion:

This study examines pulse width modulation techniques for selective harmonic removal and multiple optimization strategies for multilayer voltage source inverters. Multilevel inverters are classified and various modifications are provided to reduce the harmonics of the output voltage waveform. It discussed various improvements compared to the SHEPWM method.

References:

[1]. P. Lezana and R. Aceiton, "Hybrid Multicell Converter: Topology and Modulation", *IEEE Trans. Ind. Electron.*, Vol. 58, no.9, pp. 3938 – 3945, Sep. 2011.

[2]. M. H. Rashid, "Power Electronics Circuits, Devices and Applications", 3rd edition, Pearson Prentice Hall, 2006.

[3].SurinKhomfoi and L. M. Tolbert, "Multilevel Power Converters", *Power Electronics Handbook*, Chapter 31, 2007.

[4]. G. T. Son, Y. H. Chung, S. T. Baek, H. J. Kim,

T. S. Nam, K. Hur and J. W. Park, "Improved PD- PWM for Minimizing Harmonics of Multilevel Inverter Using Gradient Optimization", in *Proc. IEEE PES. Gen. Meeting Conf. Expo*., pp. 1-5, Jul 2014.

[5]. S. K.Peddapelli, "Recent Advances in Pulse Width Modulation Techniques and Multilevel Inverters", International Journal of Electrical, Computer Energetic, Electronic and Communication Engineering, Vol. 8, No. 3, 2014.

[6]. K. Shen, D. Zhao, J. Mei, L. M. Tolbert, J. Wang, M. Ban, Y. Ji and X. Cai, "Elimination of Harmonics in a Modular Multilevel Converter Using Particle Swarm Optimization – Based Staircase Modulation Strategy", IEEE Trans. On Industrial Electronics, Vol. 61, No. 10, Oct. 2014.

[7]. W. Fei, X. Du and B. Wu, "A Generalized Half - Wave Symmetry SHE-PWM Formulation for Multilevel Voltage Inverters", IEEE Trans. on Industrial Electronics, Vol. 57, No. 9, Sept. 2010.

[8]. H. Taghizadeh and M. T. Hagh, "Harmonic Elimination of Cascade Multilevel Inverters with Nonequal DC sources Using Particle Swarm Optimization",IEEE Trans. On Industrial Electronics, Vol. 57, No. 11, Nov. 2010.

[9]. V. G. Agelidis, A. I. Balouktsis and M. S. A. Dahidah, "A Five Level Symmetrically Defined Selective Harmonic Elimination PWM Strategy: Analysis and Experimental Validation"