Retraction

Retraction: Solar PV Based Super Lift LUO Converter for BLDC Motor Drive (J. Phys.: Conf. Ser. 1916 012144)

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This article (and all articles in the proceedings volume relating to the same conference) has been retracted by IOP Publishing following an extensive investigation in line with the COPE guidelines. This investigation has uncovered evidence of systematic manipulation of the publication process and considerable citation manipulation.

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IOP Publishing regrets that our usual quality checks did not identify these issues before publication, and have since put additional measures in place to try to prevent these issues from reoccurring. IOP Publishing wishes to credit anonymous whistleblowers and the Problematic Paper Screener [1] for bringing some of the above issues to our attention, prompting us to investigate further.

[1] Cabanac G, Labbé C and Magazinov A 2021 arXiv:2107.06751v1

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Solar PV Based Super Lift LUO Converter for BLDC Motor Drive

Mohammed Ovaiz A1, Pradeep Katta1, Senthil Kumar R1, Yugin M1, Dhiwakar M1, Chandru S1, Manikandan P1
1Department of Electrical and Electronics Engineering Veltech HighTech Dr. Rangarajan Dr. Sakunthala Engineering College, Chennai, Email: ovaiz.eee@gmail.com, pradeep.2048@gmail.com, rskumar.eee@gmail.com, yugin.manoharan@gmail.com, dhiwakar124@gmail.com, chandrumini456@gmail.com, ronaldomanikandan1999@gmail.com

Abstract. Nowadays, in electronic circuit design we are mostly using Voltage lift technique. In an arithmetic progression, it depicts the rise of voltage stage by stage. It gives voltage rising stage by stage in a geometric progression using a Super-lift converter, which is often used in solar PV applications. In power series, it enhances the transfer gain effectively. For providing good statistics and dynamic performance, Developed Cuckoo algorithm based on MPPT is used. MATLAB software is used to investigate the dynamic characteristics and analyse the closed loop performance of these converters with resistive loads under supply and load. Boosted power is supplied to BLDC motor.

Keywords: Solar PV, Maximum Power Point Tracking (MPPT), Brushless Direct Current (BLDC) motor.

1. Introduction
Choppers are playing a major role in Electronic Gadgets such as mobile phones and laptops, which are powered by a battery which delivers a constant DC output Voltage. These electronic devices consist of so many sub circuits; each circuit rated with different voltage level (say more or less value than the battery output voltage, or sometimes need negative). Also, for continuous usage of these devices may lead to drop the stored energy in the battery. Because of that, the output voltage drops. Choppers are used to generate controlled voltages of different ranges from a DC Supply say a single battery to save the effective area instead of using various batteries to supply various voltage to the individual parts of the device [1]. To Increase the Output DC Voltage, DC to DC Boost Converts are used, in that Luo converter is one of them. Luo converter provides a high gain with minimum components. In this project, we are using our voltage lift (VL) technique. Super-lift LUO Converters were formed to address this discrepancy in LUO Converters. The advantages of Super-lift converters are similar to those of Classical LUO Converters, in addition to that, the gain increase in step by step following a geometric progression. Hence it can be used in Solar PV and DC motor application. For getting the most effective system, the Cuckoo search (Meta Heuristic) algorithm is used. The super lift Luo converter has a two DC Chopper circuits connected in series with reduced ripple voltage and current. For this Converter, the gain, power density and efficiency are high compared with LUO converter. Hence these converters have their applications in Computer peripherals, Industrial Drives and Switch
mode Power Supplies [2]. The super lift Luo converter circuit has single switch, n number of inductors, 2n number of capacitors, and (3n-1) number of diodes where n indicates the integer.

2. Proposed system

![Figure 1: Pictorial representation of the Proposed System](image1)

In figure 1, the super-lift LUNO converter is placed between the Solar PV panel and the inverter. This Converter is following a geometric progression to increase the voltage from stage by stage, which is implemented in solar PV application [3]. The boosted output is fed to three phase voltage source inverter for BLDC motor drive application. Cuckoo search algorithm technique for is used for tracking the Maximum Power. Boosted output is fed to three phase voltage source inverter for BLDC motor drive application. The high voltage gain is achieved without using extreme duty cycle in super lift luo converter. To track the Maximum power point in solar PV, we are following cuckoo search algorithm which give accurate tracking and working in dynamic conditions. Brushless motor has several positive characteristics than a brushed DC motor, in view of high torque to weight ratio, Efficiency, Reliability, Noise, lifetime, erosion, absence of Brushes and Commutator, elimination of ionizing sparks, and finally cost effective.

![Figure 2: Circuit diagram of the proposed system](image2)

The figure 2 shows the circuit diagram of super lift Luo converter. It has a DC Supply $V_{in}$, Two capacitors $C_1$ and $C_2$, one inductor $L_1$, an n-Channel MOSFET act as an Electronic power switch $S$, Two freewheeling diodes $D_1$ and $D_2$ and a resistive load $R$.

3. Research Background

The recent proposal [4] “Re-Lift Converter: Design, Test, Simulation and Stability Analysis”. From the self-Lift power converter, the re-Lift’ power converter came. In which the step up DC to DC conversion takes place in a straightforward structure with an increase in efficiency, power density, and low topology. This power converter’s output voltage and current are taking a smooth curve. The output voltage is increased by two times of the input voltage when using two capacitors. Hence comparing with the super lift converter, the re-Lift power converter’s output voltage is increased by two times. The paper [5] “Negative output Super Lift converters”, a four series LUNO converters is designed. In
addition to that, the output voltage is following a geometric progression, the voltage transfer gain is increased significantly. The paper [6] “Four-quadrant operating LVO converters” such as Buck, Boost, Buck-Boost converters, Cuk converters, and LVO-converters are examples of traditional DC-DC converters that operate in an only one quadrant. Four quadrant operations are necessary in drive applications, such as in DC motors, to run in different directions in motoring operations and in braking applications. The new converter described in this paper converts DC to DC in four quadrants with forward and reverse directional energy transference. The experiment’s findings validated its characteristics. The paper [7-8] “A new adaptive Cuckoo search algorithm” which describes a new way of Cuckoo search (ACS) optimization algorithm based on conventional Cuckoo search (CS). Instead of using the Levy distribution, fitness value is taken into account for considering the step size and it is controlled. The improvement of achievement in terms of time and world minima is a second thought. According to the findings of a standard function, the ACS algorithm gives the best solution in less time than Cuckoo search [9-11].

4. Design and implementation

4.1 Renewable Energy PV System

Series and Parallel connected solar panels, Power Modulators based on the applications, and other sub electrical and mechanical components form a photovoltaic (PV) system, which uses the sun’s energy to generate electricity. Solar panels come in a variety of sizes for the applications of a small roof top to a large area for producing more power. Although PV systems may operate off-grid, this article focuses on grid-tied PV systems, which are those that are connected to the utility grid.

4.2 Super Lift LVO converter

For applications requiring a high output voltage over time, Super-Lift LVO converters have proven to be useful by means of increasing the voltage transmission gain. Using reference values, the Super-Lift LVO Boost Circuit is completely simulated in the MATLAB/Simulink environment in figure 3 and 4.

Figure 3. Simulated Proposed Circuit in MATLAB

Figure 4. PV Voltage and LVO Converter Output Voltage Waveform
The output voltage from PV panel and the Super-Lift LUO converter are shown in above.

4.3 MPPT Control strategy (Cuckoo search algorithm)

In traditional MPPT systems, two autonomous control loops are used to increase the Panel's operating point to the maximum power point. The MPPT algorithm is the first loop, and the PI controller is the second. The INC Algorithm generates an error signal that is rendered zero at the MPP point based solely on instantaneous and incremental conductance. However, due to the nonlinearity of the PI controller, this paper uses a direct control approach. The goal of this technique is to get rid of the second control loop and replace it with a simple control circuit that only employs the tracking algorithm. As a result, in this method, the controller is removed, and the duty cycles of the converters are replaced directly. The viability of the recommended system is tested using a variety of DC-DC converter topologies in figure 5.

![Flowchart for Cuckoo Algorithm (MPPT)](image)

**Figure 5.** Flowchart for Cuckoo Algorithm (MPPT)

The sequence of operations for the Cuckoo search algorithm is shown in Figure 6.

![Productivity Curve (LUO Converter By Using Cuckoo Search Algorithm)](image)

**Figure 6.** Productivity Curve (LUO Converter By Using Cuckoo Search Algorithm)

Using the Cuckoo algorithm in LUO converter, Figure 7 shows the productivity curve. The precise figure is 99.91 percent.
4.4 Lévy flight:

Cuckoos start looking for the best nest, which is an important step in their reproductive process. Finding a nest is akin to finding food in that it involves selecting and modelling walks and directions using mathematical functions, with Levy flight being one of the most prevalent. According to a recent study by Reynolds and Frey, Fruit flies travel around their surroundings by taking straight paths, sudden turns, finally it’s a Lévy flight approach. This behaviour can be seen in a variety of optimization problems. A Lévy flight is a random walk with steps characterised in terms of step lengths and a step length probability distribution. The Lévy distribution and a power law are used to compute the step length in CS. The steps are simply a power-law step-length distribution and a random walk with a long tail.

4.5 Mode of Operation

In the definition of the converter operation, all of the elements, including the positive performance elementary super lift, are thought to be optimal. In steady conduction mode, the LUO converter operates. The converter's different modes of action are shown in figures 8.

![Switch S is in ON](image1)

**Figure 7:** Switch S is in ON

![Switch S is in OFF](image2)

**Figure 8.** Switch S is in OFF

![BLDC Motor Speed](image3)

**Figure 9.** BLDC Motor Speed

The figure 9 depicts the speed of a BLDC motor, which is used as a load in this example. It rotates at a rate of about 2500 RPM.
5. Conclusion

In Super lift LUO Converter, the voltage transmission gain improves dramatically. It is essential to obtain a very high output voltage. The development and calculations were backed up by simulation and experimental outcome. DC-DC converters' output voltage and efficiency are constrained by parasitic components. Advanced voltage Lift techniques for DC-DC converter configuration and input using a PI controller using the solar PV MPPT algorithm were demonstrated. The MPPT employs the Cuckoo search algorithm, which has a good dynamic response. They decrease the parasitic element's impact and the output voltage of DC-DC converters is increased significantly, as a consequence of which quality, density of electricity are high, a simple and cost effective topology, and final voltage and current ripples that are close to zero. The proposed PI controller's rejects the variations of DC supply voltage and load resistance, resulting in output voltage of a fast converter monitoring, is supported by these results. The LUO converter's output voltage is fed into a high-speed BLDC motor drive. The proposed converter, according to the results, has a maximum efficiency of around 99.2 percent (for gain=2.53).

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