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Sliding Mode Controllers for SEPIC Converter using Matlab/Simulink

V. Kumar [1], Kalagotla. Chenchireddy[2], D. Aravind[3], P.Balakishore[4], T.Ramya Sree [5]

[1,2]Assistant Professor, department of EEE, TKREC
[3,4,5]B-Tech student, TKREC

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Abstract
now a days the importance of renewable energy sources increasing like solar and wind. Solar cells producing DC voltage, we need converters for converting DC-DC and DC-AC for standalone and grid applications. This paper introduced advance control technique for single ended primary inductor converter (SEPIC). An advanced control technique Sliding mode control (SMC), this technique fast robustness control, fast tracking response and gaining more output.

Keywords: *SEPIC converter, sliding mode control (SMC)*

I. INTRODUCTION

Circuits run best with tenacious and unequivocal data. Scheming the commitment to express sub-circuits is noteworthy for fulfilling plan necessities. Cooling AC change can be successfully completed with a transformer; at any rate dc-dc change isn't as clear. Diodes and voltage ranges are useful for diminishing voltage by a set total, yet can be ineffective. Voltage controllers can be used to give a reference voltage. Additionally, battery voltage reduces as batteries discharge which can cause various issues if present is no voltage control. The majority gainful system for coordinating voltage through a circuit is with a dc-dc converter. There are 5 essential sorts of dc-dc converters. First converter buck converter used for step down output voltage application battery charging, second converter boost converter used for step-up output voltage, buck-boost and cuk converter used for both step up and step down purposes. A couple of uses of converters simply need to buck or lift the voltage and can basically use the relating converters. Regardless, occasionally the perfect yield voltage determination be in the extent of information voltage. Exactly when this is the circumstance, it is ordinarily best to use a converter that can reduce or grow the voltage. Buck-bolster converters can be more affordable considering the way that they simply require a lone inductor and a capacitor. Nevertheless, these converters experience the evil impacts of a high proportion of data current wave. This wave can make music; in various applications these sounds require using a tremendous capacitor or a LC channel. This routinely makes the buck-bolster expensive or inefficient [1]. a new issue that can obfuscate the convention of buck-bolster converters is the manner in which that they change the voltage. Cuk converters handle both of these issues by using an additional capacitor and inductor. In any case, both Cuk and buck-help converter action cause a great deal of electrical load on the portions, this can realize contraption disillusionment or overheating. SEPIC converters deal with both of these issues [2-3].

II. SEPIC CONVERTER TOPOLOGY

All Choppers (DC-DC) converters work by rapidly murdering one and a MOSFET, all around with a high repeat beat. What the converter does on account of this is what makes the SEPIC converter dominating. For the SEPIC, when the beat is

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high/the (metal oxide field effect transistor) MOSFET is on, inductor 1 is charged by the data voltage and inductor 2 is charged by capacitor 1. The diode is off and the yield is kept up by capacitor 2. Exactly when the beat is low/the MOSFET is off, the inductors yield through the diode to the store and the capacitors are charged. The more imperative the degree of time (commitment cycle) the beat is low, the more conspicuous the yield will be. This is because the more drawn out the inductors charge, the more noticeable their voltage will be. In any case, if the beat suffers too much long, the capacitors won't have the alternative to charge and the converter will tumble as showed up in Fig.1

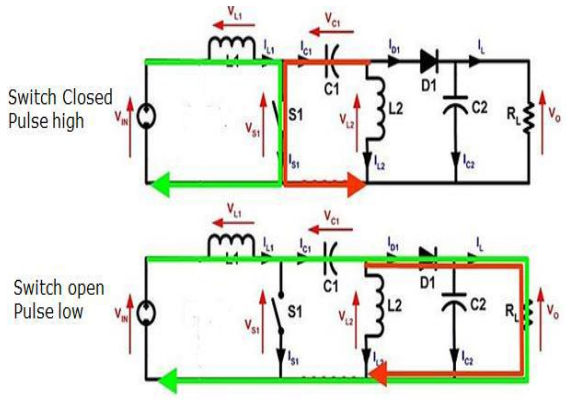

Fig.1 SEPIC operation

III. SLIDING MODE CONTROL

Sliding mode control is a specific kind of the variable structure control framework (VSCS), which is described by an intermittent criticism control structure that switches as the framework crosses certain complex in the state space to drive the framework state to reach, and hence to stay on a predetermined surface inside the state space called sliding surface. The exchanging capacity (sliding variable) is an element of the states and the sliding surface speaks to a connection between the state factors. The framework elements when restricted to the sliding surface are eluded as a perfect sliding movement and speak to the controlled framework conduct, which brings about diminished request elements as for the first plant. This diminished request elements gives alluring points of interest, for example, inhumanity toward parameter varieties and coordinated vulnerabilities and unsettling influences, making sliding mode control a suitable technique for strong control. Additionally, sliding mode control plot offers a straightforward calculation which can be actualized effectively.

IV. SIMULATION RESULTS

SEPIC converter Matlab simulation results.

Table 1. Parameters of SEPIC

Parameter	symbol	Value
Input voltage	Vin	10
Output voltage	V_0	75
Inductors	L_1 and L_2	1mH and 2.3mH
Capacitors	C_1 and C_2	470 micro F and 1 micro F
Switching frequency	fs	100kHz
Load resistance	R	100 ohms

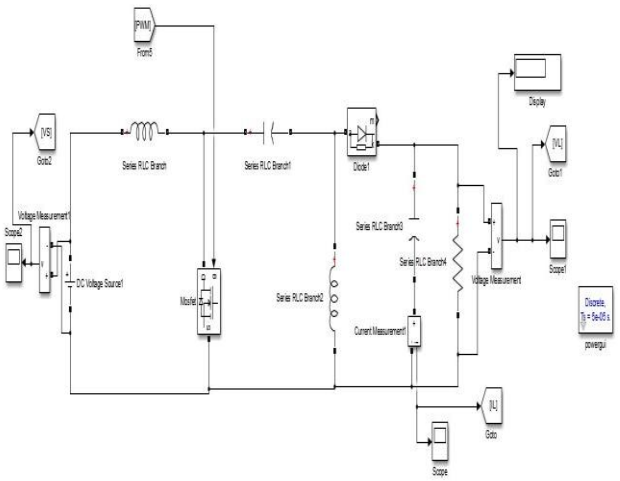

Fig.2 SEPIC Converter

Fig.2 shows SEPIC converter Matlab simulation diagram

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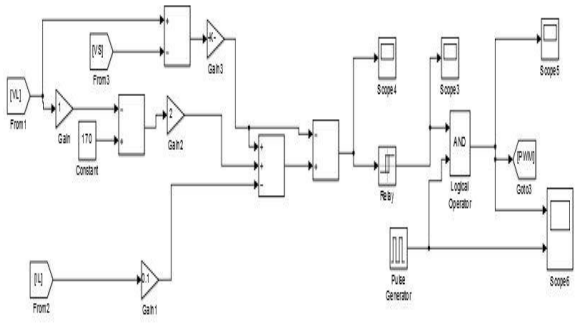

Fig.3 sliding mode control (closed loop control)

Fig.3 shows sliding mode methodology for SEPIC converter.

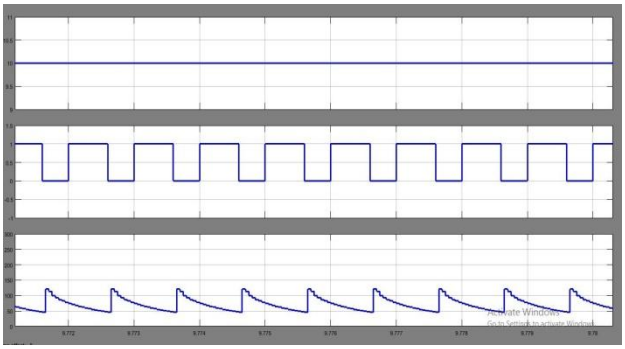

Fig 4. Input voltage, duty cycle and output voltage

Fig.4 shows input voltage 10V, duty cycle and output voltage 65V.

IV. CONCLUSION

The shut circle control of a SEPIC is planned effectively utilizing the sliding mode controller. The presented SMC controller executed in a simple stage. A significant bit of leeway of SMC controller over a PI controller lies in the way that the SMC is strong to huge varieties in line voltage and burden and parameter varieties without changing the sliding coefficients. Various reenactment and trial impacts are appeared so as to exhibit the great execution of the SMC controller. The framework displayed is reasonable for these present reality business applications, similar to the force supply for restorative types of gear, PC power supplies, continuous force supplies, and so forth. The reenactment and test results show that the proposed SMC keeps up a directed yield voltage the SEPIC in different conditions.

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