

Design and Realization of Sliding Mode Control DC to DC Boost Converter of photovoltaic systems¹

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Abstract

This research is a study of a new control method of switching non-isolated dc-dc boost converters used in Photovoltaic systems. This method is called Sliding Mode Control (SMC), which is considered as an alternative to other methods, to keep a stable and constant output voltage by changing the input voltage and load current. The analyzing method of the switching non-isolated dc-dc boost converters using SMC shows the same complexity of Classic circuits, but it gives an increasing potential and a high-dynamic response to ensure a constant output voltage reaches to 40volt by changing the input voltage in the range (16-21volt) and the load (8-13 Ω). Methods to measure the accuracy, error, and efficiency of maximum power point trackers (MPPT) have been identified and presented in a schematic way, together with definitions of terms and calculations. These methods are the result of a review on how international institutes and private industries are determining the MPPT accuracy and efficiency. The electric system's parameters representing a boost converter circuit and their control mechanism using SMC were all designed and adjusted to help making this electric system stable and to obtain the best dynamic response 1.5Sec. Results of the simulation and stability study showed reliability of the control method used in this study.

¹For the paper in Arabic see pages (147-180).

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