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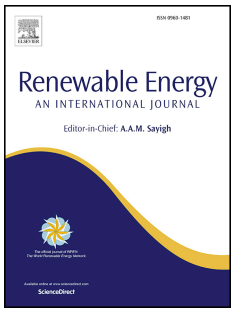

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A Maximum Power Point Tracking for Photovoltaic Systems Based on Monod Equation

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Abstract

This paper presents a maximum power point tracking (MPPT) algorithm based on the Monod equation for photovoltaic (PV) systems with DC regulation. This equation is applied to estimate the power output for each current output of PV generator. The proposed MPPT permits to quickly estimate the required duty-cycle by the step-up converter that is associated with the provided maximum power from the generator. The new MPPT algorithm has a lower implementation complexity and with a lower computational effort, which is important to implement using less expensive controllers and low cost processor. The proposed algorithm is tested in a PV system composed by solar module that emulates of PV generator and which the input voltage is regulated by a push-pull converter, supplying a DC load. The experimental results demonstrate that use of the Monod equation improves the dynamics of the PV system and find the maximum value of power for conditions of low irradiance unlike other methodologies.

Keywords: Maximum power point tracking, Monod equation, photovoltaic systems, step-up converter.

1. Introduction

In recent years, the PV systems has called attention from several research groups, with the aim of improving the conversion efficiency of solar energy to electric energy [1, 2]. The efficiency of the energy conversion from the source and delivered to the load is a paramount issue associated to the any renewable source as PV systems. In this way, it is very important to develop methods to ensure the maximum power is obtained from the PV cells. Hence, this is reached by employing the maximum power point tracking (MPPT) methods in conjunction with the DC regulation stage or together with the inverter control

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