Abstract

In this paper, a simulation model of a solar cell is defined to allow estimation of the electrical behavior of the cell with respect changes on environmental parameter of temperature and irradiance. Maximum Power Point Trackers (MPPT) play an important role in photovoltaic (PV) power systems because they maximize the power output from a PV system for a given set of conditions, and therefore maximize the array efficiency. DC/DC converters together with maximum power point tracking systems (MPPT) are used to avoid the energy losses. Different algorithms have been proposed for maximum power point tracking, the Incremental Conductance (IncCond) method is studied in this work. We present in this paper the
implementation of a photovoltaic model using Matlab/Simulink, which can be representative of PV cell module, for easy use on simulation platform. Next, a voltage control of a photovoltaic system is presented in order to have a constant voltage at the output, always keeping the system to work at maximum power. For this, two methods of control of the output voltage are presented. The first is to use a proportional, integral & derivative controller (PID), while in the second a sliding mode controller (SMC) is used. This system is tested for a resistive load and for a centrifugal pump driven by a permanent magnetic DC (PMDC) motor. The simulation results are carried out using Matlab/Simulink.

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Index Terms
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Photovoltaic generators; Maximum power point tracking (MPPT); DC/DC converters; PWM generator; voltage control; PID; Sliding Mode Controller SMC