High-Tech Based Simulation and Analysis of Maximum Power Point in Energy System: A Case Study Using IT Based Software Involving Regression Analysis

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Abstract : Improved achievement with respect to output control of photovoltaic (PV) systems is one of the major focus of PV in recent times. This is evident to its low carbon emission and efficiency. Power failure or outage from commercial providers, in general, does not promote development to public and private sector, these basically limit the development of industries. The need for a well-structured PV system is of importance for an efficient and cost-effective monitoring system. The purpose of this paper is to validate the maximum power point of an off-grid PV system taking into consideration the most effective tilt and orientation angles for PV's in the southern hemisphere. This paper is based on analyzing the system using a solar charger with MPPT from a pulse width modulation (PWM) perspective. The power conditioning device chosen is a solar charger with MPPT. The practical setup consists of a PV panel that is set to an orientation angle of 0∘N, with a corresponding tilt angle of 36∘, 26∘ and 16∘. Preliminary results include regression analysis (normal probability plot) showing the maximum power point in the system as well the best tilt angle for maximum power point tracking.

Keywords : poly-crystalline PV panels, information technology (IT), maximum power point tracking (MPPT), pulse width modulation (PWM)