THE EFFECT OF SOLAR REGULATORS ON THE PERFORMANCE AND ENERGY PROVIDED BY SOLAR SYSTEM

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Abstract

Presently, Photovoltaic and the outher resources such as the wind, the geothermal and biomass energy are the most important energetic alternative resources; in this work an experimental study of a solar system has been proposed; located in the energy site of the city of Constantine. The aim of this article is to evaluate the effect of the diffrence betwen hybrid regulateur and MPPT charge controlleur in solar system.

Keywords: *Photovoltaic; MPPT charge controller; Solar batteries; Hybrid Controller.*

Abbreviations : **MPPT :** Maximum Power Point Tracking **/AC :** Alternating current **/ DC :** Direct current / **PV :** Photovoltaic**/ Vin:** the input voltage of the Generator PV**/ Vbatt:** the voltage of solar batteries **/ Pin** : the input power of the solar controller

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I- INTRODUCTION

In solar energy, Algeria has one of the largest solar challenges in the world. The energy received daily on a horizontal surface of 1 m2 is 5 kWh. It is about 1,700 kWh / m2 / year in the north and 2,263 kWh / m2 / year in the south [1],[2]. Several investigations have been carried out for the optimal design of the autonomous solar system [3],[4].

Solar charge controllers such as the MPPT and PWM and hybrid controllers; have become essential components of the performance evaluation of Photovoltaic Power Systems.

The purpose of this article is to examine how the difference between a MPPT controller and a hybrid controller affects the input voltage of the GPV; and the power delivered by the system; and the voltage of the solar batteries.

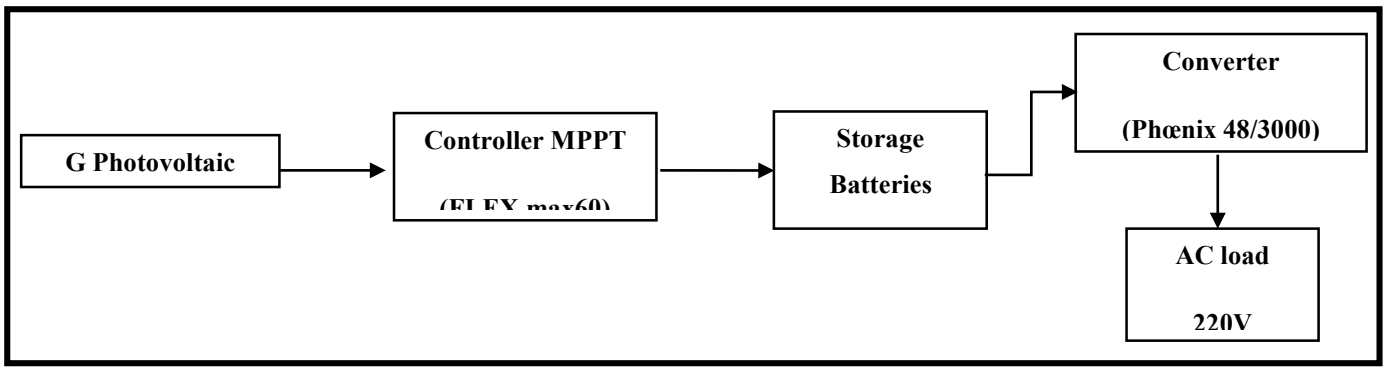
Ⅱ. DESCRIPTION OF THE SYSTEM:

In this study the system consists of two photovoltaic solar panels of polycrystalline silicon type; placed in series so a group of 390W; The structure of this application is coupled with 4 batteries assembled in series (12V, 200Ah), the battery group voltage is set to be (48V, 200Ah). Photovoltaic panels transform solar radiation into direct current (DC); this voltage is connected to the MPPT controller input (FLEX max60), For 220V AC loads; a converter (Phoenix48 / 3000) is used to convert 48V DC to 220V AC, and in the other study the MPPT controller has been replaced by a HOPEFUL hybrid controller (HF-GF-1000).

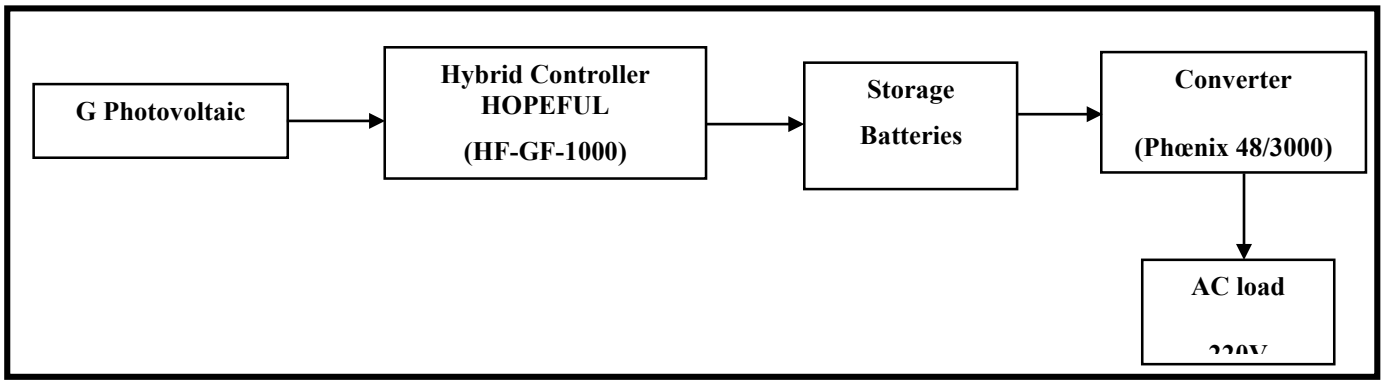
The performance of the system was evaluated for 5 hours from 9:00 to 14:00.

Fig1: presentation of the system

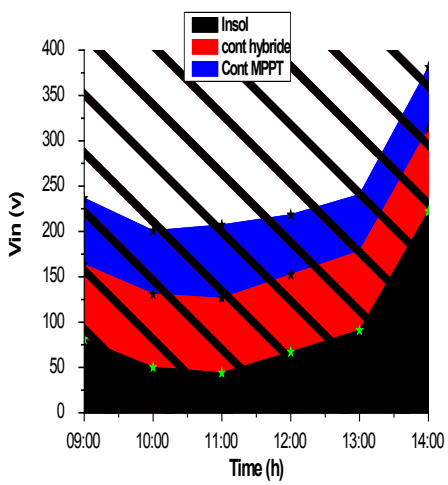
Study1 : With Mppt Charge Controller



Study 2: With Hybrid Controller HOPEFUL



Ⅲ. RESULTS AND DISCUSSION:



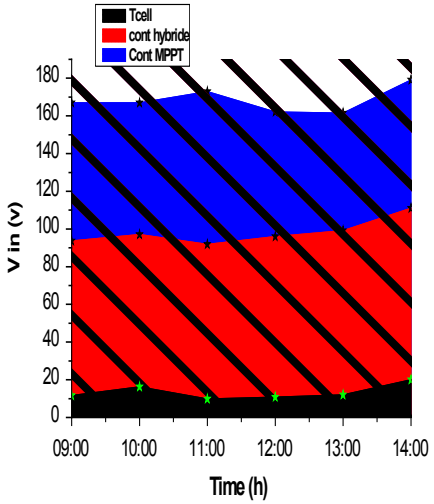


Fig2: Variation of global radiation with the input voltage of solar regulators

Fig3: Variation of the temperature of solar cell with the input voltage of solar regulators

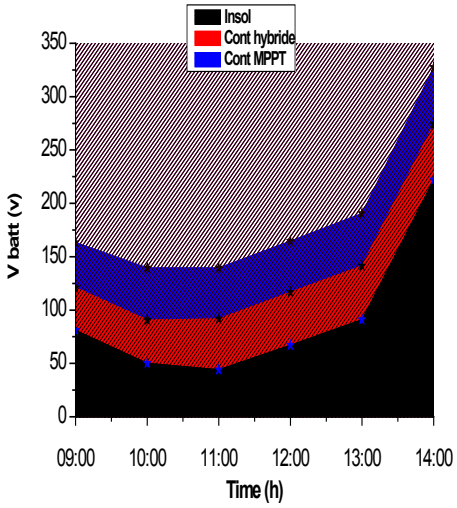


Fig4: Variation of the global radiation with the voltage of solar batteries

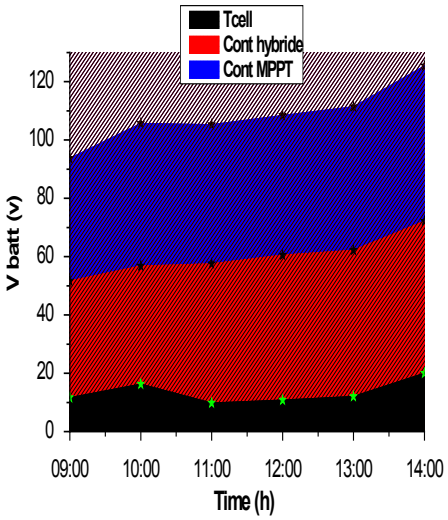


Fig5: Variation of the temperature of solar cell with the voltage of solar batteries

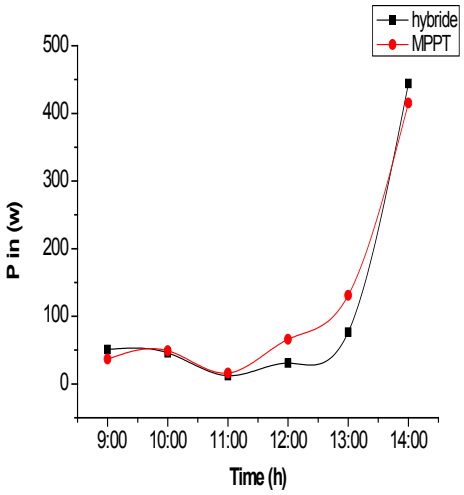


Fig6: Variation of the power delivered by the photovoltaic generator as a function of time

- The voltage supplied by the PV generator varies with the global radiation and with the temperature of the solar cell.
- The voltage of solar batteries also depends on the temperature of the solar cell and also with the global radiation.
- Input Power of solar regulators (MPPT and Hybrid Controller) increases during the day.
- The MPPT controller is the most sophisticated and efficient controller currently. This controller checks both the condition of the batteries and the potential of the panels. It constantly adjusts the panel voltage to get the most energy at all times (rain or shine).
- The hybrid controller can be a PWM as a MPPT. It is actually a controller that accepts two power sources to charge a single bank of batteries. The most common are hybrid controllers for solar panels and wind turbines. One advantage is that you have less wire and device to charge the batteries. A disadvantage is when the device breaks, all your charging sources stop charging the batteries.

Ⅳ. CONCLUSION :

If you are limited in space to add panels, using a MPPT controller will allow you to maximize your current panels. But if your group of solar panels is sufficient, at the end of the day, your batteries will be just as charged with a PWM even if it took an hour longer than with a MPPT.

If you use high-voltage panels or connect panels in series, the use of MPPT is not only essential but the only real choice; since the PWM will not only waste the excess but is often limited in the input voltage.

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