IMPROVEMENT IN EFFICIENCY OF PHOTOVOLTAIC PANEL BY DIFFERENT TRACKING METHOD

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***Abstract*—Tracking of maximum point (MPP) of a solar photovoltaic array is essential part of PV systems. The efficiency of solar photovoltaic system varies and low, under the low irradiation and weather conditions. To improve efficiency many MPP tracking (MPPT) methods have been developed and implemented. This paper represents the performance analysis of dual axis mechanical tracking system along with electrical tracking. The ultimate objective of this project is to investigate the static panel is more efficient than electrical tracking with dual axis tracking or opposite. Four LDR are used to capture the maximum light from sun. Two stepper motors are used to orient the solar PV panel to direction of sun. Second part, in electrical tracking incremental conductance method controls the duty cycle of DC to DC buck boost converter to enable the solar PV array operate at maximum operating point at all conditions. The performance of static PV system is compared with the implemented dual axis mechanical and electrical tracking and results showed that, implemented tracking methods is proven more effective for capturing the maximum sunlight source.**

***Keywords:** solar PV panel, MPPT, dual axis tracking, incremental conductance method*

1. INTRODUCTION

Solar energy is rapidly gaining popularity as compared to other renewable energy sources. The installation cost of PV panel along with the other accessories is more. Successful application of PV panel depends upon the efficiency and energy storage. In such case, the output of PV panel must be more so that it will be economical and beneficial for consumer to use it. In general, PV generation systems have two major problems; the conversion efficiency of electric power generation is low (in general less than 17%, especially under low irradiation conditions), and the amount of electric power generated by solar arrays changes continuously with weather conditions The output current vs. voltage curve of a photovoltaic cell shows a non-linear characteristic. From this nonlinear relationship, it can be observed that there is a unique point, under given illumination and temperature, at which the cell produces maximum power, the so-called maximum power point (MPP). The MPP will change with external environment of PV cell. The tracking process of maximum power point is called maximum power point tracking (MPPT). Due to a nonlinear current voltage characteristic of PV cells, it is difficult to track the MPP [2]. Solar mechanical tracker is a device used to move solar PV panel as per sun's direction. While, the electrical tracking is used when mechanical tracking fails under the low irradiance and partial shading condition. The efficiency of solar PV panel is less when solar PV panel is fixed at particular angle. By using the variable elevation mechanical solar tracker and electrical tracking, the extra power can be produced per annum as compared to static or stationary solar PV system [3]. In this project, the performance of dual axis mechanical tracking with electrical tracking (MPPtracking) is analyzed.