PV Array MPPT Technique via Boost Converter

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Abstract. Abstract- As we all know that most of the electricity generated by fossil fuels. In view of increasing the demand of electricity in domestic, industrial, agriculture and commercial purposes. We are looking for alternate source, which is solar power generating by PV cells. Solar power generation depends on the availability of solar radiation and temperature throughout the day. MPPT method is used to generate more power and this technique is environmentally friendly. Various methods are there to control MPPT, which are AI, FLC, NN, Constant V/I and PO (Perturb and observe) methods. This paper explains modeling, simulation of MPPT algorithm for PV array using boost converter. At the end results obtained in MATLAB using Simulink.

INTRODUCTION

The great advantages of solar pv system by converting sunlight into electricity are maintenance free, pollution free, depletion free of natural resources [1]. The electricity demand is rapidly increases throughout the world. So, all the nations jump into the alternate resources such as MHD generation, tidal, wind, geo-thermal, biogas, biomass and importantly solar power [2]. The main alternate for many nations is solar power because sun is available entire day and solar are cells are used to collect sunlight during the day and convert this photon energy into electricity with the help of additional equipment setup. MPPT method is used to generate more electricity with maximum operating conditions. This method can achieve better performance, efficiency and output [3].

Photovoltaic effect studies done in electro-chemical engineering, physics and photo-chemistry. The conversion of light into electricity is known as pv-effect. We get solar electric power with necessary arrangements [4]. The arrangement is having the equipment like solar panels, semiconductor devices, inverters, batteries etc. These setups may be roof-top, wall-mounted and ground-mounted. The conversion carried out by electro-chemical process to produce electric current [5]. In contrary, the major disadvantage of grid-connected pv system is output power depends on availability of sunlight [6].

Solar Cells

Solar cell is used to collect sun light from the sun. In order to receive and collect more sunlight, we need to fix solar cell in such a way [7]. Area of the solar plate and the absorption of sun light are used in calculation of solar cell efficiency. We know that these devices are photo-diode. Inverters are used to convert dc to ac in the set up [8].

MATHEMATICAL MODELLING

Boost converter is used when a higher o/p voltage than i/p is required [9]. Fig. 1(a) and (b) shows the basic boost converter and its waveforms [10].