Peripheral interface controller-based maximum power point tracking algorithm for photovoltaic DC to DC boost controller

ABSTRACT

A method of developing a maximum power point tracking (MPPT) algorithm for photovoltaic (PV) utilizing a peripheral interface controller (PIC) is presented in this paper. The efficiency and adequacy of a PV depend on the temperature and the exposed position to the sun. Thus, there is an optimum point at which the operating power is at maximum. The goal is to operate the PV module at this point (MPP). It can be accomplished by using the MPPT algorithm designed with a DC-DC boost converter. The boost converter, MPPT circuit, PIC18F4550 microcontroller and PV panel are the main components used in this design. The current and voltage produced by the solar panel are observed continuously by a closed-loop control system. The microcontroller-based control system adjusts the duty cycle of the converter to extract the maximum power. With a DC input voltage of 15 V, the boost converter is capable of generating an output voltage of an approximately 60 Vdc at a maximum power of 213.42 W with minimum voltage ripple as compared to 84 W without the MPPT. It proved the effectiveness of the developed algorithm.