Abstract

Mohamed Atef El-Saharty

Realization of DC- bus sensor-less MPPT technique for a single-stage PV grid-connected inverter

A single-stage photovoltaic (PV) grid connected system is an attractive approach for a distributed energy source due to its simple topology and low cost. However, maximum power point tracking (MPPT) algorithms require measurements on the DC side of the inverter in order to determine the operating point of the PV panel at each instant. This paper presents a sensor-less MPPT algorithm for a single-stage PV grid connected inverter where the MPPT algorithm determines whether the reference inverter operating point is below beyond the maximum power point (MPP) at different light intensities based upon the current controller action. The proposed algorithm monitors the controller action after each perturbation, if the reference power is beyond the maximum power, the controller would saturate and thus the MPP is at the previous reference power. Changes in insolation are accompanied by changes in the current controller action, which is detected by the algorithm. The overall system has been experimentally implemented and control algorithm has been validated using digital signal processing (DSP) unit. Using simulation and practical implementation results, the performance of the proposed MPPT algorithm is evaluated while limits and merits of the proposed set have been demonstrated.