

Effect of partially shaded conditions on photovoltaic array's maximum power point tracking

Abstract

Maximum power point tracking algorithm is widely implemented in photovoltaic system to maximize the PV array output power. In general, Perturb and Observe (P&O) is simple thus being selected to continuously track the array maximum power point (MPP). Under uniform solar irradiance, PV array characteristic is non-linear and consisting only one MPP along the functional operating voltage. However, when the PV array is partially shaded, the P-V characteristic becomes more complex with multiple MPPs. The occurrence of multiple MPP might cause the PV array to be trapped at the local MPP. At this operating condition of local MPP, PV array will generate lesser output power. In this study, the performance of PV array is explored especially when each PV module is at 30% and 70% shaded conditions. Simulation results show that PV array at absolute MPP can generate greater output power with the largest increased by 74.6% hence achieving higher power efficiency.