

Optimization of photovoltaic energy harvesting using artificial neural network

ABSTRACT

This paper proposes artificial neural network (ANN) based maximum power point tracking (MPPT) controller to maximize the energy harvested by a grid-connected photovoltaic (PV) system under various environmental conditions. Due to the non-linear characteristics, PV system will exhibit multiple peaks when the PV array receives non-uniform irradiance. As such, the conventional perturb and observe (P&O) MPPT controller will be trapped at local maximum power point (MPP). Therefore, this paper aims to integrate ANN into MPPT controller to improve the effectiveness of the MPPT controller in tracking the global MPP. The effectiveness of the proposed method is tested under uniform and non-uniform irradiance conditions, and the performances are compared with the conventional P&O. The simulation results show the proposed method able to track the global MPP even the PV system exhibits multiple peaks under non-uniform condition, whereas the conventional P&O is trapped at local MPP. Thus, the proposed algorithm is able to harvest much energy as compared to the conventional method.