A hybrid MPPT for quasi-Z-source inverters in PV applications under partial shading condition

Abstract:
The quasi-Z-source inverter (qZSI) in a photovoltaic (PV) generation system (PGS) has been very popular among researchers due to its ability to boost the PV voltage with its single-stage topology. In comparison to the conventional two-stage inverter, the qZSI comes with lower cost and higher efficiency. So far, research was focused on different qZSI topologies and their control methods. Not much attention has been given to one of the most important parts of a PGS, i.e. the maximum power point tracker (MPPT). This paper proposes a hybrid MPPT method for a PGS under partial shading condition (PSC) by combining an intelligent particle swarm optimization (PSO) algorithm with a simple but effective perturb and observe (P&O) technique. With these two MPPT algorithms, a much more accurate detection of the maximum power point (MPP) of a PGS under PSC can be attained, which is otherwise unachievable if they work independently. Simulation results based on MATLAB-Simulink are presented to verify the proposed method.