

A novel capacitor voltage control for Z-source inverter based photovoltaic power conversion systems

Abstract

Z-source inverter (ZSI) could be used to realise both DC voltage boost and DC-AC inversion in one single stage with reduced number of power switches for photovoltaic (PV) power conversion systems (PCS). Maximum power point tracking (MPPT) control algorithm provides the shoot-through interval which should be inserted in the switching waveforms of the inverter to output the maximum power to the Z-network. At this instant, the voltage across the Z-source capacitor is equal to the output voltage of PV array. This paper presents a unified MPPT control strategy along with a modified MPPT algorithm to achieve the MPPT as well as capacitor voltage control simultaneously. Development and implementation of the proposed algorithm and comparison with traditional results are discussed. The effectiveness of the unified MPPT algorithm is verified by MATLAB/Simulink software and confirmed by experiment.

Keywords

Capacitor voltage control; Maximum power point tracking; Photovoltaic array; Power conversion system; Pulsewidth modulation; Z-source inverter