Abstract

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DC-link Voltage Sensorless Control Technique for Single-phase Two-stage Photovoltaic Grid-connected System"

Control techniques, applied to single-phase two-stage grid-connected photovoltaic (PV) systems, mainly achieve functions of maximum power point tracking (MPPT), voltage adjustment at inverter DC-link, and grid current control. Conventional control techniques require measurements of PV voltage and current, DC-link voltage, and grid voltage and current. Commonly, sensorless techniques are proposed to simplify system implementation and decrease its entire size and cost. However, most focus on eliminating PV voltage and/or current sensors. In this paper, a sensorless technique is proposed which keeps PV sensors, but eliminates the expensive high DC-link voltage sensor by mitigating the inverter DC-link voltage control loop. Alternatively, voltage regulation at inverter DC-link is achieved through power balance guarantee at this link. Hence, control complexity is minimized and system stability is enhanced. Moreover, the entire system implementation is simplified and its dynamic response is improved during sudden irradiance changes. Simulation work is carried out to verify the effectiveness of the proposed technique when compared to the conventional one regarding their transient and steady-state performance under varying irradiance conditions.