

Sliding Mode Control of a Photovoltaic Grid-Connected System with Active and Reactive Power Control

Authors : M. Doumi, K. Tahir, A. Miloudi, A. G. Aissaoui, C. Belfedal, S. Tahir

Abstract : This paper presents a three-phase grid-connected photovoltaic generation system with unity power factor for any situation of solar radiation based on voltage-oriented control (VOC). An input voltage clamping technique is proposed to control the power between the grid and photovoltaic system, where it is intended to achieve the maximum power point operation. This method uses a Perturb and Observe (P&O) controller. The main objective of this work is to compare the energy production unit performances by the use of two types of controllers (namely, classical PI and Sliding Mode (SM) Controllers) for the grid inverter control. The proposed control has a hierarchical structure with a grid side control level to regulate the power (PQ) and the current injected to the grid and to obtain a common DC voltage constant. To show the effectiveness of both control methods performances analysis of the system are analyzed and compared by simulation and results included in this paper.

Keywords : grid connected photovoltaic, MPPT, inverter control, classical PI, sliding mode, DC voltage constant, voltage-oriented control, VOC

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