Current Limiter Strategy of Grid-Connected PV System for LVRT Enhancement

N. Jaalam, N. A. Rahim, and A. H. A. Bakar

Abstract A low-voltage ride-through (LVRT) is an ancillary service provided to a power grid to stabilize the grid voltage under weak grid conditions. Under these circumstances, a short-term disturbance is allowed to be ride-through to prevent unnecessary nuisance tripping during weak grid conditions. The main objective of this paper is to propose an active power curtailment strategy for a 1.038 MW grid-connected photovoltaic (PV) system to enhance the LVRT capability. A simple current limiter was applied to regulate the excessive DC-link voltage while the reactive power was controlled by a PI-tuning controller to maintain the voltage profile. Using MATLAB/Simulink environment, the dynamic behaviors of the proposed system were tested under 70% voltage sag and it was found that the proposed strategy is successful in curtailing the active power during low-voltage conditions and the excessive DC-link voltage can be controlled. Meanwhile, the whole system can maintain its operation without inverter disconnection and the voltage profile was improved even under weak grid conditions.

Keywords Active power curtailment · Reactive power control · Low-voltage ride-through · Grid-connected PV system

1 Introduction

One of the grid-connected photovoltaic (PV) system's most critical perturbations is a voltage sag. Voltage sag could be caused by large loads connection/disconnection or could be triggered by adverse weather conditions such as lightning strikes [1, 2]. In the past, when such fault occurred in a grid-connected power system where the

N. Jaalam (✉) · N. A. Rahim · A. H. A. Bakar
Higher Institution Centre of Excellence (HICoE), UM Power Energy Dedicated Advanced Centre (UMPEDAC), Level 4, Wisma R&D, University of Malaya, Jalan Pantai Baharu, 59990 Kuala Lumpur, Malaysia
e-mail: zila@ump.edu.my

N. Jaalam
Faculty of Electrical and Electronics Technology, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia

K. Isa et al. (eds.), *Proceedings of the 12th National Technical Seminar on Unmanned System Technology 2020*, Lecture Notes in Electrical Engineering 770,
https://doi.org/10.1007/978-981-16-2406-3_86