Title:	Transient Stability Enhancement of a Grid-Connected Large-Scale PV System Using Fuzzy Logic Controller
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Abstract:

This paper presents a new intelligent control strategy to augment the low-voltage ride-through (LVRT) potential of photovoltaic (PV) plants, and the transient stability of a complete grid system. Modern grid codes demand that a PV plant should be connected to the main power system during network disturbance, providing voltage support. Therefore, in this paper, a novel fuzzy logic controller (FLC) using the controlled cascaded strategy is proposed for the grid side converter (GSC) of a PV plant to guarantee voltage recovery. The proposed FLC offers variable gains based upon the system requirements, which can inject a useful amount of reactive power after a severe network disturbance. Therefore, the terminal voltage dip will be low, restoring its pre-fault value and resuming its operation quickly. To make it realistic, the PV system is linked to the well-known IEEE nine bus system. Comparative analysis is shown using power system computer-aided design/electromagnetic transients including DC (PSCAD/EMTDC) software between the conventional proportional–integral (PI) controller-based cascaded strategy and the proposed control strategy to authenticate the usefulness of the proposed strategy. The comparative simulation results indicate that the transient stability and the LVRT capability of a grid-tied PV system can be augmented against severe fault using the proposed FLC-based cascaded GSC controller.

Keywords: Fuzzy logic controller (FLC); grid side converter (GSC); low-voltage ride-through (LVRT); photovoltaic (PV) system; transient stability