

MPC of Single Phase Inverter for PV System

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Abstract : This paper presents a model predictive control (MPC) of a utility interactive (UI) single phase inverter (SPI) for a photovoltaic (PV) system at residential/distribution level. The proposed model uses single-phase phase locked loop (PLL) to synchronize SPI with the grid and performs MPC control in a dq reference frame. SPI model consists of boost converter (BC), maximum power point tracking (MPPT) control, and a full bridge (FB) voltage source inverter (VSI). No PI regulators to tune and carrier and modulating waves are required to produce switching sequence. Instead, the operational model of VSI is used to synthesize sinusoidal current and track the reference. Model is validated using a three kW PV system at the input of UI-SPI in Matlab/Simulink. Implementation and results demonstrate simplicity and accuracy, as well as reliability of the model.

Keywords : phase locked loop, voltage source inverter, single phase inverter, model predictive control, Matlab/Simulink

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