# Abstract


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### PV Maximum Power Point Tracking under Rapidly Changing Irradiance: Control Scheme Investigation


In this paper, the maximum power point tracking (MPPT) issue, in standalone photovoltaic (PV) systems, is considered. Various control schemes are investigated under varying irradiance conditions. Directly controlling the MPP converter shows good transient performance, yet with the highest steady-state power oscillations at the MPP. On the contrary,closed-loop control, using a classical PI controller, produces low steady-state power oscillations, but exhibits the worst transient performance. Thus, this paper proposes an adaptive fuzzy-tuned PI controller to compromise between the steady-state and transient performance during sudden changes. Simulation results show that the proposed controller can achieve the least power oscillations as well as the fastest dynamic performance and the same overshoot achieved by the direct-control model. All the previous schemes use variable-step Incremental Conductance (IncCond.) MPPT method. However, in order to study the impact of the applied MPPT algorithm on the system response, an open-loop fuzzy-logic MPPT technique is presented and compared with the IncCond. model adopting the adaptive controller. The performance of the fuzzy-based MPPT model outweighs the latter regarding the transient overshoot and has a relatively simpler structure. However, it's slower to reach the MPP and experiences more steady-state power oscillations especially with severe changes