Moth flame optimization maximum power point tracking algorithm for photovoltaic system under partial shaded conditions

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ABSTRACT
This paper presents a study in maximum power point tracking (MPPT) technique in solar photovoltaic (PV) using moth flame optimization (MFO) algorithm. Despite the solar PV is one of the most popular method for power generation, the effort to maximize the energy yield from the installed PV system remains a challenge. The study aims to identify the performance of MFO based MPPT algorithm under partial shaded conditions. A simulation model of MFO based MPPT algorithm was developed and implemented with DC/DC boost converter in MATLAB Simulink. For comparison, a well-established particle swarm optimization (PSO) algorithm was included in the study. Both MPPT algorithms were examined under MATLAB simulation as well as real-time hardware-in-the-loop (HIL) platform using HIL emulator and digital signal processing (DSP) card. Under 10 partial shaded condition test cases, the MFO has shown its capability in tracking for the maximum power operating point effectively, with zero steady state oscillation. Both algorithms in study have shown their capability in tracking for maximum power operating point with output efficiency up to 99% in both simulation and real-time platform.

KEYWORDS
Maximum power point tracking; Particle swarm optimization; Moth flame optimization

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