# Swarm intelligence-based MPPT design for PV systems under diverse partial shading conditions

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**ABSTRACT**

The photovoltaic (PV) system has attracted attention in recent years for generating more power and freer from pollution and being eco-friendly to the environment. Nonetheless, the PV system faces many consequences under partial shading (PS) on account of the non-linear nature of the environment. Various traditional methods are used to solve the difficulties of the PV system. However, these methods have oscillations around global maxima peak power (GMPP) and are not able to deliver accurate outcomes when the system becomes complex. Therefore, the combination of teaching-learning (TL) and artificial bee colony (ABC) called TLABC are hybridized in this work for mitigating the oscillations around the GMPP. To find the effectiveness of the proposed method, it can be evaluated with other methods such as PSO, IGWO, MFO, and SSA. As per simulation outcomes, the proposed TLABC shows greater performance in terms of Standard Deviation (SD), Mean Absolute Error (MAE), Successful rate (Suc. Rate), and efficiency are 3.95, 0.13, 98.88 and 99.89% respectively. Furthermore, the suggested system is evolved in the PV laboratory and tested in four different cases for validating the system performance with simulation outcomes. It is found that the suggested TLABC method ensures a greater performance than other studied methods.

**KEYWORDS**

Partial shading condition (PSC); Particle swarm optimization (PSO); Photovoltaic (PV); Salp swarm optimization (SSA); Swarm intelligence; Teaching learning-based artificial bee colony (TLABC)

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