

Particle Swarm Optimization Based Maximum Power Point Tracking Algorithm for Photovoltaic Energy Conversion System

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Abstract: In order to extract the maximum power from PV system, the maximum power point tracking (MPPT) method is one of the most popular and widely used and it has always been applied in photovoltaic energy conversion system. However, this method exhibits fluctuations among the maximum power point (MPP) due to the nature of unpredicted and changes of the environmental parameters. Therefore, it is significant to include an intelligent controller that can track the maximum peak regardless of parameters variations such as: irradiation and temperature. This paper describes the design and development of particle swarm optimization (PSO) based maximum power point tracking (MPPT) algorithm for photovoltaic energy conversion system. The proposed MPPT is simple, flexible, accurate and efficient in maximum photovoltaic power tracking. In this work, MATLAB/Simulink simulation package is used to simulate the performance of the proposed MPPT algorithm. The performance of the proposed PSO algorithm is evaluated by comparing it with the conventional P&O method in terms of tracking speed and accuracy. The simulation results demonstrate that the tracking capability of the PSO algorithm is more efficient, comparing to the traditional one, particularly under parameters variation conditions.

Keywords : Photovoltaic systems, Maximum Power Point Tracking (MPPT), Particle Swarm Optimization (PSO), perturb and observe (P&O)