Improving the Performance Analysis of MPPT Controller Unit of a PV Generation System Using Optimization Technique based on Spider Monkey Principle (SMO).

Sriparna Das and Dr. Kumari Namrata

Department of Electrical Engineering, NIT Jamshedpur, Jharkhand, India-831014

ABSTRACT

The use of renewable energy sources like PV unit, wind, etc. for power generation increases a lot due to the mankind focusing on saving of coal, petroleum and other non-renewable sources of energy production and minimizing the cause of pollution. The power that is generated from PV source is not ample amount for supplying electricity to large area so, it must be operated at MPP for obtaining the maximum amount of energy during the production. In this paper the stress has been given in developing spider monkey technique in controlling the controller unit for generating the duty for the boost converter to operate at MPP, so that maximum amount of energy is being produced. The design of the solar based generation is explained, along with the mathematical modelling is performed, followed by designing a flowchart of SMO technique which is used in generating pulses for the switch of the converter block for tracking of MPP by the help of a PI controller unit. Perturb and Observe technique that is used for MPP tracking is discussed in details. The comparison has been made between PI based SMO and simply using of SMO in the block diagram model and it is observed that the performance for power production is slightly better in the first case than the later one. By changing the different environmental effect, the performance of the model shows an improved character. The use of SMO technique thus gives the better performance analysis by minimizing the errors and generating the duty properly. The simulation and the results which are discussed in this paper is entirely performed in MATLAB and are explained subsequently.

Keywords: PV cell mathematical model, Effect of change of parameters, Converter Design, MPPT P&O Algorithm, SMO Technique.