

An Intelligent Voltage Controller for a PV Inverter System Using Simulated Annealing Algorithm-Based PI Tuning Approach

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Abstract: This study associates an intelligent voltage controller based PI approach for PV electrical inverter by employing a meta-heuristic optimization algorithmic called a Simulated Annealing (SA) algorithm. It's outlined as a physical process of minimization which is a kind of optimization problems. During this methodology, the procedure of trial and error in getting k_p and k_i parameters utilized in a conventional PI controller is avoided. Besides, it is then used to optimize the PI parameters in order to get the desired output voltage of the PV electrical inverter along with the PWM method. The proposed design of the overall PV electrical inverter is modelled using simulink/code of matlab environment. As a result, firstly; to evaluate the proposed controller (SA-PI) of the PV inverter. Its performance is investigated by connecting three different loads to the system. Noted that, it is robust in terms of voltage amplitude, Total Harmonic Distortion (THD) and a minimum value of Mean Absolute Error (MAE). Secondly, the SA algorithm based PI controller generally provides a better desired output and fast response with a high convergence rate as compared with the PSO algorithm.

Key words: PV inverter, simulated annealing algorithm, mean absolute error, total harmonic, distortion and matlab code
