Abstract:

An optimum PI controller using harmony search optimization algorithm (HS) is utilized in this research for the single-phase bipolar SPWM inverter. The aim of this algorithm is to avoid the conventional trial and error procedure which is usually applied in finding the PI coefficients in order to obtain the desired performance. Then, the control algorithm of the inverter prototype is experimentally implemented using the eZdsp F28355 board along with the bipolar sinusoidal pulse width modulation (SPWM) to control the output voltage drop under different load conditions. The proposed overall inverter design and the control algorithm are modelled using MATLAB environment (Simulink/m-file Code). The mean absolute error (MAE) formula is used as an objective function with the HS algorithm in finding the adaptive values of Â and Â parameters to minimize the error of the inverter output voltage. Based on the output results, the proposed voltage controller using HS algorithm based PI (HS-PI) showed that the inverter output performance is improved in terms of voltage amplitude, robustness, and convergence rate speed as compared to PSO algorithm based PI (PSO-PI). This is to say that the proposed controller provides a good dynamic responses in both cases; transient and steady-state. Finally, the experimental setup result of the inverter controller is verified to validate the simulation results.