

This paper characterizes the sampling effect in digital sinusoidal pulse width modulation (SPWM) of voltage source inverter (VSI). The time-domain analysis presented in this paper establishes the relation between the fundamental frequency, carrier frequency, and the sampling frequency at different modulation indices of the SPWM. The analysis investigates the effect of sampling frequency of the digital controller on the output of the VSI. It is shown that the low-frequency harmonic components appear in the frequency spectrum of the VSI output voltage due to sampling. As a result, the output current of digitally controlled VSI is stepped in nature. The double Fourier integral solution of the switched waveform for inner and outer integral limits has been used to derive the expression. The integral solution is obtained using Jacobi-Anger expansions. The generalized results developed in this paper are useful to investigate the sampling effect in high switching frequency DSPWM. The proposed sampling effect has been analyzed for SPWM of single-phase H-bridge inverter. The analytical results are verified using simulation and experimental results. The experimental results have been obtained with the use of field-programmable gate array (FPGA) as a digital controller.