Chapter 9

Low switching frequency operation of multilevel converters for high-power applications

Zahoor Ahmad Ganie[1,2], Abdul Hamid Bhat[1] and Salman Ahmad[2]

This chapter explains the low switching frequency operation of multilevel converters for high-power applications with a focus on selective harmonic minimization for controlling the harmonic magnitude from the output waveform. The intelligent solving techniques have been employed to obtain the optimal switching angles that will provide desired fundamental component and control on selected harmonics component magnitude. The insights provided in this study will benefit the researchers and engineers working on high-power application of multilevel converter systems.

9.1 Introduction

The energy generated from renewable energy sources produces DC electricity, whereas the transmission of the electric power and the loads use AC power. Therefore, a conversion device is required for converting DC power into AC power [1]. A power electronic device called inverter [2] converts DC power/voltage into AC power/voltage [3]. Such equipment or loads which need AC power require inverters for their operation [4]. Inverters are energy conversion devices that are cost-effective, simple, and efficient in operation. Inverters are often used in renewable energy systems [5] and power electronics-based sectors [6], academics and industry researchers are constantly focusing on inverter research and development. Inverters have various advantages, however, the output voltage generated from an inverter contains a fair amount harmonic content [7], which can affect the various components of the system. Lower order harmonics are more threatening to the systems than the harmonics of higher order due to the fact that these harmonics' frequency is around the fundamental frequency and have a larger magnitude [8].

[1]Department of Electrical Engineering, National Institute of Technology Srinagar, India
[2]Department of Electrical Engineering, Islamic University of Science and Technology, India