Abstract

Ibrahim Ab Abdelsalam

Comparison of two advanced modulation strategies for a hybrid cascaded converter

is paper summarises an investigation into two modulation strategies that enable a hybrid cascaded multilevel converter to reduce on-state losses and extend the modulation index linear range independent of load power factor, and without capacitor voltage balancing problems. The first modulation strategy exploits unconventional triplen harmonics in combination with a hybrid modulation strategy to optimally reduce the number H-bridge cells required to minimize semiconductor losses, and improve capacitor voltage balancing of the H-bridge cells. The second modulation strategy is based on level-shifted multilevel carriers and exploits 3rd harmonic subtraction to modify the modulating signals in order to extend the regions around zero voltage crossing where cell capacitor voltage balancing can be achieved, with a minimum number of cells. It is shown that both modulation strategies overcome the traditional limitations of hybrid cascaded converter such as dependency of the capacitor voltage balancing on modulation index and load power factor. Also they extend the modulation linear range virtually up to 1.27 in real power applications. Simulation and experimental results at several operating points are used to substantiate the strategies presented in this paper.