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Development of High Voltage Multilevel Step-wave Voltage Source

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With the development of energy Internet, the proportion of modular multilevel converter in the system further increases. High-voltage multilevel stepped waves become a typical waveform stressed on the related insulation. In order to study the insulation characteristics of equipment under multilevel stepped wave stress, it is necessary to develop a high-voltage multilevel step-wave voltage source. The regnant single-phase MMC topology in the existing topology is analyzed, while the topology output voltage waveform is biased due to the polarity effect of the load discharge, which does not meet the stability requirements of the voltage source. A new topology structure using positive and negative half-bridge submodules is proposed, which requires fewer switching devices, and is easy to expand to multi-level high voltage, with stable output waveform and flexible frequency and amplitude. The working principle of this topology and the nearest level modulation strategy are introduced. The control system is realized by STM32F407ZGT6. A multistage staircase voltage source prototype is built to verify the feasibility of the proposed topology.

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