

How to control a variable frequency capacitor voltage?

Therefore, for variable-frequency operation, it is necessary to remove the suppression method at higher frequencies and only use the balance control method of the MMC sub-module to control the fluctuation of the sub-module capacitor voltage.

How can circulating current and capacitor voltage fluctuation be improved?

If the control effects of secondary control objectives, such as circulating current, are poor, the proposed method can increase the output range of the PR controller, improve the adjustment ability for the candidate combinations, and thus enhance the control effect on the circulating current and capacitor voltage fluctuation.

What if capacitor voltage fluctuation is greater than circulating current deviation?

The reverse is also true. 1: If , it means that the capacitor voltage fluctuation is greater than the circulating current deviation, and the system is in a transient state; excessive deviation in the capacitor voltage fluctuation from the reference requires priority control.

What happens if the capacitor voltage is too low?

However, the fluctuation of the capacitor voltage of the MMC sub-module is inversely proportional to the working frequency of the MMC. When the MMC working frequency is too low, the MMC sub-module capacitor voltage fluctuates beyond the range allowed, that is, damage to the device affects the normal working.

What is sub-module capacitor voltage fluctuation?

It can be seen from the above waveforms that the sub-module capacitor voltage fluctuation is always controlled to less than 6% during the simulation process. When the working frequency of the MMC system is changed, the sub-module capacitor voltage fluctuations remain within a reasonable range, and there are no significant mutations. Fig. 11.

What is the maximum fluctuation amplitude of capacitor voltage?

Between 0.4 s and 0.7 s, the maximum fluctuation amplitude value of capacitor voltage is 108 V, and the fluctuation amplitude range is 8%. This is much smaller than the fluctuation amplitude value of the capacitor voltage without the suppression strategy.

Meanwhile, the SM capacitor voltage fluctuation of the upper and lower arms of MMC system can be suppressed by an optimal high-frequency injection method. Simulation and experiment results confirm ...

In order to reduce the capacitance of the sub-module of modular multilevel converter (MMC), it is necessary to suppress the fluctuation of the capacitor voltage, thereby reducing the size and cost of the MMC. In order to realize the lightness of MMC, this article proposes a double-frequency circulation injection strategy. First, it analyzes the characteristics of sub-module capacitor ...

Alternate arm converter (AAC) is a recently proposed promising modular multilevel converter. This paper presents a module-capacitor voltage fluctuation suppression strategy based on optimized zero-sequence voltage injection for the AAC. A mathematical analysis for the module-capacitor voltage fluctuation is presented first. Meanwhile, a set of control procedures is designed to ...

Due to possessing full-bridge submodules (FBSMs), hybrid modular multilevel converter (HMMC) can operate under over-modulation conditions. Meanwhile, the 2nd-order ...

Then the characteristics of capacitor voltage fluctuation in HBSMs and FBSMs are portrayed. Based on the characteristics, the runnable region for hybrid MMC is demonstrated, and the principles to ...

After that, the capacitor voltage fluctuation of FBSMs and HBSMs with regard to different modulation indices were comprehensively analyzed. The formula for calculating the ...

The capacitors buffer power fluctuations at fundamental and second harmonic frequency, therefore the capacitor voltage ripple magnitude increases with decreasing phase current frequencies and will ...

The modular multilevel converter (MMC) is one of the most potential converter topologies for medium/high power/voltage applications. One of the main technical challenges of an MMC is to eliminate/minimize the circulating currents within the legs. Circulating currents, if not properly controlled, increase the amplitude of capacitor voltage variations, rating values of the ...

The operating principle and capacitor voltage fluctuation suppression method of hybrid MMC are analyzed in detail, which shows that the hybrid MMC can suppress the voltage fluctuation and eliminate the influence of injecting high-frequency components. Moreover, considering the feature of FC-SM, a novel hybrid capacitor voltage control is ...

Finally, the proposed technique for suppressing the capacitor voltage fluctuations is experimentally validated on a 600-V three-level MMC feeding an inductive load. The voltage fluctuations are reduced by more than 50% (63.6%) when the proposed technique is applied with a high common-mode frequency.

capacitor voltage fluctuation of the submodule, circulating current loss, and capacitor loss [8]-[10]. Among them, the capacitor voltage fluctuation of the submodule is a prominent

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