

Fault-Tolerant Configuration for T-Type Nested Neutral Point Clamped Converter

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Abstract : Recently, the use of T-type nested neutral point clamped (T-NNPC) converter has increased in medium voltage applications. However, the T-NNPC converter architecture's reliability and continuous operation are at risk by including semiconductor switches. Semiconductor switches are a prone option for open-circuit faults. As a result, fault-tolerant converters are required to improve the system's reliability and continuous functioning. This study's primary goal is to provide a fault-tolerant T-NNPC converter configuration. In the proposed design utilizing the cold reservation approach, a redundant phase is considered, which replaces the faulty phase once the fault is diagnosed in each phase. The suggested fault-tolerant configuration can be easily implemented in practical applications due to the use of a simple PWM control mechanism. The performance evaluation of the proposed configuration under different scenarios in the MATLAB-Simulink environment proves its efficiency.

Keywords : T-type nested neutral point clamped converter, reliability, continuous operation, open-circuit faults, fault-tolerant converters

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