

Fault-Tolerant Design of a Classical Voltage-Source Inverter Using Z-source and Standby Redundancy

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Resumo:

This paper proposes modifications of the classical two-level three-phase voltage-source inverter topology structure with the aim of increasing its reliability to safety-critical applications. This solution intends to achieve fast changing and “soft” commutation between main and redundant branches through the combination of mechanical commutators and power devices. Also, important modifications in the power supply stage will allow to withstand severe short-circuit conditions. With those modifications, the energy processing capability can be maintained for most common failure modes. Several aspects of failure modes, detection and isolation processes within voltage-source inverters are also discussed regarding the requirements of safety related applications. Experimental results from a prototype are included to confirm the validity of the proposed solution.