Minimising torque ripple and harmonic distortion in open-circuit five-phase induction motors fed by NPC inverters using predictive current control

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Abstract

The Three-Level Neutral-Point-Clamped (3L-NPC) inverter offers significant advantages for electric propulsion systems, especially in reducing total harmonic distortion and torque ripple. These enhancements improve motor efficiency, ensure smoother operation, and minimise mechanical wear, making the 3L-NPC inverter an ideal choice for highperformance applications in modern electric transportation. Building on these benefits, this paper presents a predictive current control strategy specifically designed for NPC inverters functioning under open-phase fault conditions in five-phase induction motors. Simulation results reveal superior performance across various torque loads, underscoring the advantages of this approach in comparison to the conventional two-level topology.