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Five-Phase Induction Motor Drive System Driven by Five-Phase Packed U Cell Inverter: Its Modeling and Performance Evaluation

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Abstract : The three phase system drives produce the problem of more torque pulsations and harmonics. This issue prevents the smooth operation of the drives and it also induces the amount of heat generated thus resulting in an increase in power loss. Higher phase system offers smooth operation of the machines with greater power capacity. Five phase variable-speed induction motor drives are commonly used in various industrial and commercial applications like tractions, electrical vehicles, ship propulsions and conveyor belt drive system. In this work, a comparative analysis of the different modulation schemes applied on the five-level five-phase Packed U Cell (PUC) inverter fed induction motor drives is presented. The performance of the inverter is greatly affected with the modulation schemes applied. The system is modeled, designed, and implemented in MATLAB®/Simulink environment. Experimental validation is done for the prototype of single phase, whereas five phase experimental validation is proposed in the future works.

Keywords : Packed U-Cell (PUC) inverter, five-phase system, pulse width modulation (PWM), induction motor (IM)
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