Design, analysis and vector control of three-phase induction motors with copper rotor for electric v

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ABSTRACT

This thesis studies the design, analysis process, and vector control of an induction motor applied to an electric vehicle. Electric cars should have high power density and high efficiency. In order to achieve these requirements, we raise the stator winding slot rate and use the high-grade thin silicon of steel to reduce core loss. In addition, stator windings use short-pitch and double-layered windings of design to reduce the primary wire loss and high frequency harmonics. To increase conductivity and reduce the secondary wire loss, rotor winding is also used by copper rotor. This design is the electric vehicle of induction motor that contains a 3-phase 4-pole, continuous power output 35 kW, maximum power 105kW and efficiency higher than 94%. It explains that the motor design, electromagnetic field and equivalent circuit analysis points. Eventually, we conduct the characteristic Simulation and measuring. In the motor vector of control research, first of all, we understand the three-phase induction motor vector control of coordinate transformation theory, which contains PARK, CLACK conversion and PI control etc. Then we discussed for the amount of scalar, direct and indirect field-oriented control.Finally, using the MATLAB / SIMULINK conduct the Simulation and Analysis for motor open loop, closed-loop and Field-oriented speed control system, and we discussed for the dynamic response under different loading.

Keywords : 電動車、感應馬達、有限元素分析、銅轉子、向量控制

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