INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Increasing global warming and limited reserves of fossil fuels have created the need for alternatives to conventional internal combustion engines (ICE) based vehicles as primary mode of transport. In present time, Electric Vehicles (EV) are being seen as the solution for these problems. EVs integrated with renewable energy sources, completely eliminate dependence on fossil fuel as well as can drastically reduce emission of greenhouse gases. Therefore, a lot of attention is being given to the development of efficient, reliable and cost effective EVs by automobile industry as well as academic institutions. Electric powertrain consisting of electric motor, drive system and battery as the main source of energy, is the most important part of an EV. Among all these parts, electric motor is responsible for driving the vehicle. Therefore, its rating, efficiency, control, cost etc. are very important factors from EV application viewpoint. Therefore, design and analysis of a motor suitable for EV application have been chosen as the aims for this thesis.

Different types of motors can be used for EVs. EVs operating with induction motor, permanent magnet brushless DC motor and brushed DC motors have been manufactured by vehicle manufacturers. The characteristics required for the motor to be used in electric vehicle are high torque and power density. In this work a dual rotor motor, a hybrid combination of permanent magnet synchronous motor and induction motor is presented. Various possible configuration and design, performance analysis, prototyping and testing for the selected configuration has been discussed in detail.

The prototype of DRM presented in the thesis is not an optimized one and power density and efficiency of the motor were not focused on. The presented motor is first prototype in the ongoing research work and thus considering the mechanical complexities and availability of resources, the scope of the practical work was limited to proof of concept of DRM and understanding of challenges involved. The lessons learnt during the process will be implemented during manufacturing of subsequent prototypes of DRM.