Abstract of Ph.D. Thesis
"Design and Control of Switched Reluctance Motor for EV Drives"
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This research work deals with the design, modelling, control and development of switched reluctance motor (SRM) drive for electric vehicle (EV) application. Compared to a conventional EV motor, SRM has simple construction, higher starting torque, no rare earth magnet requirement, wide speed range, higher fault tolerance, thereby making them relatively more efficient. In this work, a mutually coupled SRM is designed and modelled magnetic equivalent circuit. This model is combined with Taguchi's optimization for reduced torque ripple and increased torque output and compared with other hybrid method combining finite element analysis with parametric and Surrogate model optimization. Further, control methods are explored with optimization of conduction angles while considering multiple objectives. Moreover, improved torque control method is implemented and reference model-based speed controller is utilized. This method is implemented with idea of reducing error in torque reference which further effect the torque ripple. A reduced sensor-based simple, efficient and cost-effective SRM drive is investigated. The estimation of rotor speed and position, is made with conventional lookup table-based method and compared with interpolation method. Moreover, current sensor reduction technique for mid-point converter fed system which requires fewer switches compared to conventional AHB converter is implemented with lesser number of current sensors without any external input resulting a cost -effective compact SRM drive.