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Abstract:

The principle of field oriented control (FOC) or vector control (VC) of induction motors (IMs) is based on the control of both the magnitude and the phase of each phase current and voltage to achieve the decoupling control strategies between flux and torque. To control the flux and the torque precisely based on the FOC, core losses (CL) and stray load losses (SLL), which are generally neglected, should be considered in the mathematical model of IM to design the controller. In order to achieve the precise flux and torque control of IM, some of literatures have proposed to detuning method for FOC of IM to compensate the effects of CL and SLL. But it has seen that the mathematical modeling of detuning process is very complex which makes the complexity in the case of implementation also. In this paper, a novel FOC of IM with consideration of both CL and SLL is proposed. In this novel FOC of IM includes the decoupling control strategy which is easier than the detuning strategy. The effectiveness of proposed FOC of IM considering CL and SLL has been verified by the simulation work which has been done by using Matlab/Simulink. The simulation results show that the speed control with decoupling of flux and torque control for high performance of IM with considering CL and SLL based the proposed FOC can be achieved.

Keywords: Induction motor, Core loss, Stray Load loss, Field-oriented control, PI controller