

C715888 : MAJOR ELECTRICAL ENGINEERING

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SURAPONG SUWANKAWIN : A VOLTAGE-SOURCE-TYPE SPEED-SENSORLESS VECTOR CONTROL SYSTEM FOR INDUCTION MOTORS.

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In this thesis we present a novel design and implementation method for a speed- sensorless vector control system of an induction motor. Our aim is to achieve good responses to speed commands and loads with the overall system still being in the open loop configuration, and therefore can replace the existing V/F inverters. The stability limitation of the speed estimation system has been analyzed by the parametric approach, from which we can obtain analytical conditions for stability. Following these conditions, we can enlarge the stable region to render the stability of the speed estimation. We also develop a design guideline for speed estimation system to obtain satisfactory performance comparable to the conventional vector control system with speed-sensor. Furthermore, the structure of the developed system is simple to implement, because we construct the speed estimation subsystem on the same rotor flux reference frame as the vector control subsystem, and then merge the induction motor model of both subsystems together to eliminate model redundancy. The way we view the overall system in the integral sense is different from the fragmental one taken in the past. Simulation and experimental results verify the feasibility of the proposed system.

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