

THREE PHASE V/f DRIVE USING AT89C52

SUVARUN DALAPATI AND SNEHASISH PAL

Abstract

Electronically controlled AC motor-drives are finding wide applications in various fields, such as rolling mills, railways etc. In many such applications, steady state performance is the chief criterion and transient performance does not hold much importance. Such applications often require cheap and simple control-strategies, which will reliably operate the drive in a wide load / input-voltage range. Hence, numerical control strategies, such as Vector / Field Oriented control techniques are not required for such applications. In this paper, a simple algorithm for inverter-based three phase induction motor-control, based on the V/f strategy, and input DC bus voltage feedback, is presented. The entire algorithm for the application is achieved using the widely available industry-standard AT89C52 microcontroller from Atmel Corporation. The strategy is based on stepped trapezoidal modulation and appropriately utilizing the constant torque and constant power zones of operation for the motor. The strategy is tested on a fabricated 4-layer PCB based control card, driving an IGBT based 6-switch 3-phase PWM inverter, with a 40V, 0.87hp, 50Hz, 3-phase induction motor. It is observed that the simulation and experimental results are closely matching for various operating points, thereby justifying the effectiveness of this control-strategy.

Keywords: AT89C52, AC-Motor-Drive, Microcontroller, PWM inverter, Stepped-PWM technique

Subject Classification: Power Electronics and Machine Drives