Universal motor speed control with current controlled PWM AC chopper by using a microcontroller

Bodur, H. Bakan, A. F. Sarul, M. H.
Dept. of Electr. Eng., Yildiz Tech. Univ., Istanbul, Turkey

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Abstract:
In this paper, a universal motor speed control system with a PWM AC chopper is introduced. Operation principles of the control system, which is realized with a microcontroller, are presented. Mathematical model of the universal motor and PWM AC chopper is derived and the behavior of the system is studied by simulation. Mains power factor, motor speed, and current are analyzed for different load conditions. Harmonic analysis of the motor current and voltage are given and compared with phase control technique. Experiments are made to verify the effectiveness of the system. According to the experimental results, both simple hardware design and good speed response can be attained.