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Abstract
The brushless DC motor (BLDCM) provides the merits of a DC motor, such as large output torque, high performance, and easy control, as well as without brush and commutator by performing electronic communication. It would be better for a sensorless control of BLDCM drive that will have more applications without environmental constraints and less expense.
A digital signal processor (DSP)-based drive is proposed in the thesis. The rotor angle will be estimated without current sensors and analog-to-digital converter (ADC) at rest and during motor running. The sector of initial rotor angle located is first detected by employing low-frequency voltage injection instead of conventional high-frequency voltage injection to improve the sector estimation. After starting, the electrical rotor angle is synchronously estimated with PWM (pulse-width modulation) frequency such that the number of estimation will increase in the case of lower speed command. This will be more efficient on speed control than the algorithm by detecting the zero-crossing information of back electromotive forces (EMFs) from motor terminal voltages.
The DSP TMS320F240 is adopted to provide its built-in hardware for related functions. As a result, the commutation is completed during motor running and motor speed may also be well estimated by sensorless control.
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