Abstract

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High starting performance synchronous motor

With the advancement of technology, the area of applications for electric motors increases in a versatile manner. AC drives in industrial applications are rapidly increasing. It has replaced the DC motors in motion control applications and possibly makes DC motors relatively obsolete by the beginning of the next century. For high performance drives that require very rapid dynamics and precise regulation, the need of vector control is becoming an urgent demand. In order to provide a method of decoupling the two components of stator current: one produces the air gap flux and the other producing the torque. Therefore, it provides an independent control of torque and flux, which is similar to a separately excited DC motor. Thus, vector controlled motor drive offers a number of attractive features such as smooth operation at a wide range of speeds, high torque capability, and high efficiency along with higher power factor. Electric motors have a variety of speed-torque characteristics during steady state and transient operations. For a given drive applications, motors are often ed to match the characteristics of the required operation, determined by the mechanical load characteristics and the available power supply. Series DC motor has a high starting torque. Also separately excited DC motor can operate above the base speed in the fieldweakening region by reducing the field current independently. However, due to commutators, DC motors are not most suitable for high-speed applications and require more maintenance than do AC motors .Therefore, in this paper a vector controlled drive system is suggested to run the synchronous motor so as to obtain the performance of the series DC motor below base speed and the performance of the separately excited DC motor above base speed. The synchronous motor vector control strategy is explained and the control circuit is proposed. A steady state and transient analysis of the motor is performed below and above base speed.