

Low-Voltage Multiphase Brushless DC Motor for Electric Vehicle Application

Authors : Mengesha Mamo Wogari

Abstract : In this paper, low voltage multiphase brushless DC motor with square wave air-gap flux distribution for electric vehicle application is proposed. Ten-phase, 5 kW motor, has been designed and simulated by finite element methods demonstrating the desired high torque capability at low speed and flux weakening operation for high-speed operations. The motor torque is proportional to number of phases for a constant phase current and air-gap flux. The concept of vector control and simple space vector modulation technique is used on MATLAB to control the motor demonstrating simple switching pattern for selected number of phases. The low voltage DC and inverter output AC are desired characteristics to avoid any electric shock in the vehicle, accidentally and during abnormal conditions. The switching devices for inverter are of low-voltage rating and cost effective though their number is equal to twice the number of phases.

Keywords : brushless DC motors, electric Vehicle, finite element methods, Low-voltage inverter, multiphase

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