

Design of an Outer-Rotor Permanent-Magnet Brushless DC Motor for Light Traction through Transient Finite Element Analysis

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Abstract

The advent of high-field permanent-magnet materials has opened up opportunities for electrical machine topologies with substantially improved performance, typically in terms of higher torque-to-mass ratio and improved efficiency. In this paper a new design of an outer-rotor permanent-magnet brushless DC hub motor for light traction and low speed is analysed. The proposed motor has 40 permanent-magnet poles made of NdFeB, and 60 stator slots. The motor is studied by means of the finite element software Flux 2D, coupled to Matlab[®]/Simulink. Transient responses of phase current waveform, speed, output power and torque are presented.