A cost effective BLDC drive for the water pump application: Analysis, design, and experimentation

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Abstract

In this paper, novel magnetic calculations for a cost effective Brushless DC motor (BLDC) drive in a water pump application was carried out using finite element method (FEM). The sensorless control of (BLDC), which provides a minimal pulsating torque, was implemented using a simple two-layer printed circuit board (PCB). The new PCB provides power and control voltages, thus eliminates the need for a control battery. Simulation was performed using ANSOFT software and then being verified experimentally. The results have shown that the motor efficiency is 99% with an overall cost of $68 USD. Moreover, the wire to water (overall) efficiency is 56% compared to the market based of 37%.

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