Design and test of DC motor drive system for agriculture electric vehicle

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Abstract. This research has been design a 1-seat agriculture electric vehicle modified from ATV using by DC motor 48 V 1,000 watts. This electric vehicle has 4 batteries of 12 V 40 AH for power source. The size of the vehicle is 0.785 × 1.20 × 0.815 m, weight of about 152 kilograms. The performance test of theagriculture electric vehicle shows that the maximum speed can be achieved at average of 41.5 kilometres per hour, test by people weighting 60 kilogram. The average times for accelerated from 0-20, 0-30 and 0-40 kilometres per hour are 2.66, 4.67 and 5.84 seconds, respectively. The operating time of the electric vehicle can be used at the average of 30.50 minutes; running at an average distance of 13 kilometres with charged battery takes an average 29.88 minutes.

1. Introduction

The energy consumption in Thailand has been increased, especially in transportation, logistic, technology. Since February, 2019, Thailand has about 39.79 million registered vehicles and fuel consumption is 4.28 million tons. While in agricultural, they use of automobiles, both in the cultivation process [1], harvesting and transporting products, makes the total cost to be spent on fuel energy costs thatmake a high cost of product. They also release the pollutant such as carbon dioxide into the environment which affected to the climate change phenomena, greenhouse effect, and so on.

Now a day, the researchers have been focusing to use renewable energy to compensate the fuel energy. There are many technological whichdeveloped in transportation as electric vehicles. These electric vehicles have clean energy and low pollution [2]. The main components for driving arebattery, inverterand motor. Battery is serves to store electrical energy, inverter serves to control and convert energy to the motor [3], finally motor to send power to the shaft for drive. So, the electric vehicle can greatly reduce fuel consumption, environmentally friendly, and reduce global warming. Therefore, electric vehicle have been interesting alternative to energy conservation [4]

So, this research has been design a 1-seat agriculture electric vehicle modified from ATV using by DC motor for using in agriculture part [5]. We focused to decrease the fuel consumption and environmental problems.