Mathematical Statistician and Engineering Applications
ISSN: 2094-0343
2326-9865

Numerical Simulation and Comparative Assessment of PMSM Based Motor Charactersitics for Electric Vehicle Applications

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Article Info
Page Number: 1278 – 1293
Publication Issue:
Vol. 71 No. 3s2 (2022)

Article History
Article Received: *28 April 2022*
Revised: *15 May 2022*
Accepted: *20 June 2022*
Publication: *21 July 2022*

Abstract

Worldwide, electric vehicles (EVs) are becoming more popular than traditional vehicles powered by fossil fuels. However, the higher cost of an EV's purchase means that it may remain a major roadblock for the market. Customers choose electric vehicles for a variety of reasons, including lower carbon emissions, better performance, and more. Environmental awareness and a vision for renewable energy are essential to ensuring the long-term viability of energy production. According to a recent study, the demand for electric vehicles will rise by 2-6 percent for every 1 percent increase in renewable energy sources. By altering the recharging power at a given time interval, electric vehicles (EVs) can offer new potential for delivering regulation services and a wide range of consumption options. Modeling electric vehicles is the primary subject of this dissertation. A Rinehart motion systems-AC motor controller- 'PM100DZ' will be used to replicate the performance of an Evoelectric 'AF-130' Permanent Magnet Synchronous Motor. Using this data, researchers were able to better understand how permanent-magnet motor drives work. Simscape blocks used to model PMSM and vector control are to be validated in this effort. As a last step, parameter estimation was used to tweak the Dynamic motor and Thermal models. Datasheet values and simulated data still differed, and this difference was investigated to determine its source.

Keywords:-Photovoltaic (PV), Electrical Vehicle , Characteristic Analysis, Design Simulation, Modeling

I. INTRODUCTION

Traditional fossil-fuel vehicles are losing ground to electric vehicles (EVs), which are becoming more popular around the world. But because batteries are so expensive, the price of an EV may remain the biggest obstacle to its adoption in the marketplace. Due to their zero carbon emissions and greater performance, electric vehicles have become increasingly popular with consumers. For the future of our energy supply, we need consumers who care about the environment and who have a positive outlook on renewable energy. An increase in renewable energy of just one percent is expected to bring in a 2–6 percent increase in EV demand. This chapter focuses on charging stations for electric vehicles (EVs), as well as the increasing use of distributed generators in the grid. Photovoltaic (PV) energy sources and battery storage technologies are described in detail. Lastly, the chapter wraps up by providing an overview of the proposed system's high-level design and a summary of the information in the following chapters.