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Experimental performance characteristics of 1 kW commercial PEM fuel cell

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Abstract. The aim of this paper is to analyze the performance of commercial fuel cell (rated capacity 1000W) with the help of resistive load and output power variation with change in H_2 flow rate and calculate the maximum power point (MPP) of the proton exchange membrane (PEM) while changing AC and DC load respectively. The factors influencing the output power of a fuel cell are hydrogen flow rate, cell temperature, and membrane water content. The results show that when the H_2 flow rate is changed from 11, 13, and 15 Lpm, MPP is increased from lower to higher flow rate. The power of the fuel cell is increased at the rate of 29% by increasing the flow rate from 11 to 15 lpm. This study will allow small-scale industries and residential buildings (in remote or inaccessible areas) to characterize the performance of PEMFC. Furthermore, fuel cell helps in reducing emission in the environment compared to fossil fuels. Also, fuel cells are ecofriendly as well as cost effective and can be the best alternative way to convert energy.

Keywords: hydrogen flow rate; MPP; PEM fuel cell; performance characteristics

1. Introduction

Fuel cells generate electricity and heat during electrochemical reaction which happens between the oxygen and hydrogen to form the water Nowadays, Fuel cell systems are widely used in both small and large-scale applications, including combined heat and power (CHP) systems, Portable power systems, portable computers, and military communication equipment are all examples of mobile power systems (Mekhilef *et al*. 2012). It has been depicted as the substance designing strategy for delivering energy is produced by electrochemical redox reactions that occur at the cathode and anode of the battery The power module ensures a low-polluting, highly efficient energy source that may be designed to employ an almost infinite amount of fuel excess. In contrast to sustainability, the transformation of the world's energy supply from wood to natural gas in the mid-nineteenth century. These transitions are in line with predictions of energy sources as a tool for long-term economic growth, based on the idea that there will come a time when global the battery, it is intended for the constant recharging of the reactant consumed, and generates power

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