World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:10, No:01, 2016

Influence of Driving Strategy on Power and Fuel Consumption of Lightweight PEM Fuel Cell Vehicle Powertrain

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Abstract : In this paper, a prototype PEM fuel cell vehicle integrated with a 1 kW air-blowing proton exchange membrane fuel cell (PEMFC) stack as a main power sources has been developed for a lightweight cruising vehicle. The test vehicle is equipped with a PEM fuel cell system that provides electric power to a brushed DC motor. This vehicle was designed to compete with industrial lightweight vehicle with the target of consuming least amount of energy and high performance. Individual variations in driving style have a significant impact on vehicle energy efficiency and it is well established from the literature. The primary aim of this study was to assesses the power and fuel consumption of a hydrogen fuel cell vehicle operating at three difference driving technique (i.e. 25 km/h constant speed, 22-28 km/h speed range, 20-30 km/h speed range). The goal is to develop the best driving strategy to maximize performance and minimize fuel consumption for the vehicle system. The relationship between power demand and hydrogen consumption has also been discussed. All the techniques can be evaluated and compared on broadly similar terms. Automatic intelligent controller for driving prototype fuel cell vehicle on different obstacle while maintaining all systems at maximum efficiency was used. The result showed that 25 km/h constant speed was identified for optimal driving with less fuel consumption.

Keywords : prototype fuel cell electric vehicles, energy efficient, control/driving technique, fuel economy
Conference Title : ICEES 2016 : International Conference on Energy and Environmental Sciences
Conference Location : London, United Kingdom
Conference Dates : January 18-19, 2016