ABSTRACT

The purpose of this study is to establish dynamic models and evaluation methodology between subsystems performance for backward powertrain simulation of Hybrid Electric Vehicle (HEV). This study used the fuzzy logical based and logical based energy management in the parallel powered HEV to compare the controlled system performance. The control input factors in power switch system are velocity demand, vehicle torque, and the state of charge (SOC) of battery. Rules of fuzzy and logic control were being set for different operating conditions, for the purpose of more effective output power management to improve the HEV fuel mileage and emission. HEV powertrain system simulation can integrate the modules of subsystems including internal combustion engine, electric motor-generator, fuel cell system and transmission system and their controllers. This study established HEV powertrain system dynamic models by an object-oriented simulation software Matlab/Simulink, to analyze relationship the HEV parameters and its performance. The simulation results were compared with a HEV simulation program ADVISOR. This HEV simulation program was used to study the transient responses of vehicle torques, speeds, fuel economy, battery power, and emissions under different vehicle driving conditions. Different control methods and power combination performance were compared, results showed that a potential fuel economy improvement by using the proper fuzzy logic and logic controller. This simulation program can promptly established correlations between performance parameters, and the design parameters, control parameters under different operating conditions, thus provides the engineers a better reference to reduce designing errors and shorten the designing schedule, which could reduce the HEV cost and increase the design and commercial competitive ability of HEV controller.

Keywords : fuzzy logical based, logical based energy management