Simulator design and performance analysis for an automotive plug-in fuel cell system

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As it comes to commercialization, the hydrogen fuel cell vehicles (HFCVs) have faced to their various limitations in terms of cost and durability. Thus plug-in fuel cell vehicles (PFCV) which can solve the mentioned problems have been proposed as early commercialized products instead of the HFCV. Compared to the HFCV, the fuel cell capacity can be reduced by using the large battery as one of the main vehicle engines. Thus the cost of fuel cell can be decreased and the durability of fuel cell can be improved. In this paper, the simulator for the PFCV has been developed and the driving stability of the PFCV has been analyzed based on the developed simulator. In addition, operating control logic for the PFCV can be introduced. The simulation is performed with full driving duty including the urban and high-way driving schedules like conventional gasoline vehicles. The results of driving stability have changed with respect to the capacities of the fuel cell and battery. From those results, the required capacities of the fuel cell and battery in the PFCV are determined for the given driving schedule. Consequently, the proposed simulation allows that the design cost and time of the PFCV to be greatly reduced.