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Dynamic modeling of fuel cell system for mobile application using Simulink environment

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A dynamic model of a system including a proton exchange membrane (PEM) fuel cell and its fuel processing section has been developed. The goal was to investigate the process configurations to identify the optimal operating conditions in order to achieve the fast response of 5 kW power productions for mobile application. Here, we apply basic chemical engineering principles to gain insight into the performance in each components of a fuel processor. A simulation model using Simulink environment (Matlab 6.5.1) has been developed. The model includes an autothermal reactor (ATR), a water gas shift reactor (WGSR), a preferential oxidation reactor (PROX) and the two cooler units for the fuel processing feeding a proton exchange membrane (PEM) fuel cell stack. The model was simulated in the range of minimum and maximum operating conditions for each units due to achieve the fast power produce, under 10 ppm CO concentration feeding to cell and results validation. Furthermore the dynamic behaviours of the model were also studied.