2-Dimensional Modeling of a Catalytic Autothermal Diesel Reformer

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In the operation of heavy duty vehicle for transportation, engine idling for power production when the main power is off, is one of the carbon dioxide emission sources. As an alternative of engine idling, Auxiliary Power Unit (APU) using fuel cell is suggested due to its higher fuel efficiency and lower carbon dioxide emission than idling. Among the fuel cell, Solid Oxide Fuel Cell (SOFC) can be used as an APU for vehicle because of its high operating temperature. To operate SOFC, diesel reformer is attached to convert diesel fuel into hydrogen and carbon monoxide (syngas) and provides them to SOFC stack. Recently, Prof. Bae's group developed catalytic autothermal (ATR) diesel reformer including desulfurizer and post-reformer. But the mathematical model for this reformer is not established yet. In this study, 2-dimensional modeling for ATR catalyst region of the reformer is performed. The model represents how the conditions such as temperature and pressure of the ATR reforming region, and amount of fuel are related to the production of syngas. Simulation software gPROMS made by PSEnterprise is used to perform the study.