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## Design of isooctane fueled plug flow reactor for vehicles with SOFC

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Fuel cell vehicles are promising to reduce air pollution. The isooctane can be stored instead of hydrogen in vehicles with solid oxide fuel cell (SOFC). Hydrogen can be produced from fossil fuels through a process of fuel reforming using isooctane. The chemical reaction takes place under non-isothermal conditions in a plug flow reactor. In this study, a plug flow reactor is simulated for isooctane reforming reaction to produce hydrogen gas under both adiabatic and nonadiabatic conditions via a simulation software using finite element analysis. It is observed that the reactor temperature and fuel conversion is a function of the reactor volume for both cases. As the isooctane reforming reaction is endothermic, the temperature profile along the plug flow reactor displays different trends depending on whether the reactor is operated adiabatically or nonadiabatically. The reaction rate, which is also a function of reactor volume, is affected by the reactor temperature change. In addition; the temperature and composition of the feed stream are also investigated. It is found that temperature profile and hydrogen production yield along the reactor changes drastically according to the feed temperature, feed composition and heat exchange.

### Biography

Cüneyt Ezgi is an Associate Professor and Head of the Department of Mechanical Engineering at Beykent University. He graduated from the Mechanical Engineering at Gazi University in 1991. He joined Turkish Naval Forces in 1993 as Naval Engineer Ensign. He received European Welding Engineering diploma from European Welding Federation in 1994. Dr. Ezgi received his Msc and Ph.D. degrees in the Department of Mechanical Engineering at Ege University in 2004 and 2009. He was certified as Energy Manager by EIE in 2011. He retired from Turkish Naval Forces at rank of Naval Engineer Captain in 2016. His general research interests are energy, heat transfer, thermodynamics, thermal systems engineering, refrigeration, heat exchangers, heat pumps, renewable energy, hydrogen and fuel cells, naval engineering systems.

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