5th International Conference on Environmental Design and Health, ICED2024

# Introduction to the Performance Study of Hydrogen Combustion Engines

ASRIH Hala * , EL KALKHA Hanae *
* Innovative Technologies Laboratory

## Introduction

The transition to a low-carbon economy requires alternative propulsion technologies, such as hydrogen combustion engines and fuel cells. Although promising for reducing emissions and improving efficiency, these engines face significant technical and infrastructural challenges, the resolution of which is essential for widespread adoption.

## Methodology

The Simulink model provides information on the operation of the PEMFC and how various factors influence its efficiency, allowing for the prediction and optimization of its performance.

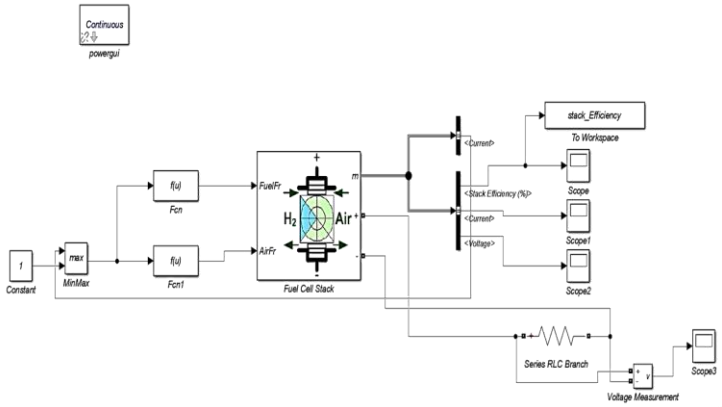


**Figure 1:** Simulink Model of a PEM Fuel Cell

## Objective

The aim of this study is to evaluate the efficiency, power, and emissions of hydrogen internal combustion engines in order to determine their viability as an environmentally friendly alternative to conventional internal combustion engines.

## Analysis

**Influence of Temperature:**

Temperature has a significant influence on the efficiency and performance of the cells at a fixed pressure :

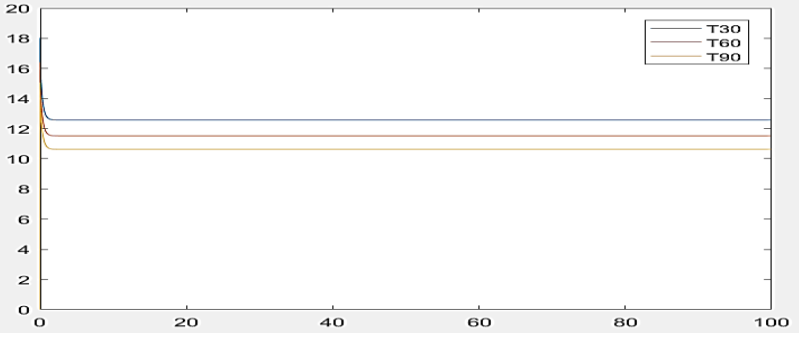


**Figure 2:** Impact of the temperature on the efficiency

- Higher temperatures can improve the reaction kinetics within the PEMFC, thereby enhancing efficiency and electricity production.

**if prefer to present my poster online.**

## Hydrogen Engines

Hydrogen internal combustion engines enable immediate use in existing vehicles, while hydrogen fuel cells offer a long-term vision with reduced emissions. These technologies are converging towards sustainable mobility, requiring technological advances and supportive policies.

## Conclusion and prospects

The study of hydrogen combustion engines is essential for the energy transition, offering a low-carbon alternative. Although they offer significant advantages, they face technical challenges such as energy efficiency and hydrogen storage. Future prospects include optimization by modeling, improving hydrogen supply circuits and exploring industrial implications. Wider adoption could significantly decarbonize transport if these challenges are overcome.

## Contact

**Email 1** : asrihhala@gmail.com

**Tel 1 :** +212636561820

**Email 2** : mae.hanae@uae.ac.ma

**Tel 2** : +212661050755