Cycle Analysis of In-Cylinder Heat Transfer Characteristics for Hydrogen Fueled Engine

M. M. Rahman[ab], Khalaf I. Hamada[a], K. Kadirgama[ab] and Rosli A. Bakar[a]
[a]Faculty of Mechanical Engineering, Universiti Malaysia Pahang, 26600, pekan, Pahang, Malaysia.
[b]Automotive Engineering Centre, Universiti Malaysia Pahang, 26600, pekan, Pahang, Malaysia.

ABSTRACT
The overall heat transfer process within the in-cylinder for port injection hydrogen fueled internal combustion engine (H2ICE) was investigated. One-dimensional gas dynamics was used to describe the flow and heat transfer in the components of the engine model. The engine model was simulated with a variable injection timing, engine speed and equivalence ratio (ϕ). Simulation was executed for 60 deg ATDC ≤ θinj ≤ 160 deg ATDC (during the intake stroke), 1000 ≤ rpm ≤ 6000 and 0.2 ≤ ϕ ≤ 1.2. The experimental data were utilized for validation purpose of the adopted numerical model. The baseline engine model with gasoline fuel was verified with experimental data, and reasonable agreement has been achieved. The overall results show that there is a combined influence for the engine speed and equivalence ratio on the overall heat transfer characteristics. The identification for the effect of the injection timing on the overall heat transfer characteristics has been failed because the injection issue is not considered within the combustion approach.

KEYWORDS: Hydrogen fueled engine, cycle analysis, port injection, injection timing, engine speed, heat transfer rate.

DOI: 10.5897/SRE10.1168