

Experimental and numerical analysis of flow and heat transfer characteristics of EGR cooler in diesel engine

S.S. Hoseini^a, G. Najafi^a, Barat Ghobadian^a, Talal Yusaf^c, Rizalman Mamat^b

*a*Tarbiat Modares University, Tehran, Iran

*b*Universiti Malaysia Pahang, Malaysia

*c*University of Southern Queensland, Australia

ABSTRACT

In this study, the heat transfer characteristics of three types of EGR coolers, such as Shell and tube-type EGR cooler (6 mm), Shell and tube-type EGR cooler (8 mm), and stack type-EGR cooler, were numerically investigated. The accuracy of predictions was verified by experimental results. A maximum difference between the numerical result and the experimental result for heat transfer efficiency of 9.22% was obtained. The results showed that the heat transfer efficiency of stack type-EGR cooler is higher of 36.6% and 27.7% than Shell and tube-type EGR cooler (6 mm) and Shell and tube-type EGR cooler (8 mm) was higher respectively. The results showed by increasing the mass flow rate, the heat transfer efficiency in the stack type-EGR cooler almost remain constant. When the stack type-EGR cooler is used, the heat transfer coefficient and Nusselt number improve significantly compared to the Shell and tube-type EGR cooler (6 mm) and Shell and tube-type EGR cooler (8 mm).

Keywords: Numerical heat transfer; EGR cooler; Nusselt number; Heat transfer coefficient