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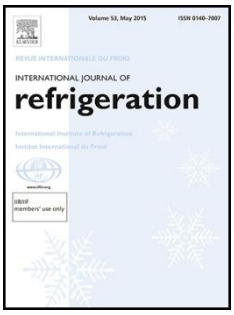

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Cooling effect characteristics of a ½ cycle refrigeration system on an LPG fuel system

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Highlights:

- ½ cycle refrigeration system on LPG-fuelled vehicle has been investigated.
- The cooling effect depends on the LPG flow rate and the evaporation pressure.
- COP on direct refrigeration (COP_{DR}) depends on the vapor quality coming out of the evaporator.
- The COP_{DR} increases when evaporation pressure is increased but decreases when LPG mass flow rate is increased.

Abstract

This paper presents a new concept for air-conditioning systems in Liquefied Petroleum Gas (LPG) fuelled vehicles, a ½ cycle refrigeration system. Prior to being used in an engine as a fuel, LPG serves as a refrigerant. Harvesting of cooling from LPG was carried out by an auxiliary evaporator. Initially, to evaporate LPG in an Original Equipment Manufactured (OEM) of vaporizer, water coolant is used. In these systems, the thermal energy to evaporate LPG is obtained from air driven by an electric blower. Cold air exiting from the evaporator may then be supplied to the cabin. The test results show that the actual cooling effect produced is as high as 1.2 kW for a LPG flow rate of more than 3 g/s and an air mass flow rate of 16 g/s. In conclusion, the ½ cycle air conditioning system is a promising application for LPG-fuelled vehicles to reduce the load on air-conditioning systems.

Keywords: LPG fuelled vehicle, ½ cycle refrigeration, cooling effect.