

A Study on Heat Transfer Performance Characteristics of a Binary Refrigerant Mixture

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Extended Abstract

In response to global regulations to reduce greenhouse gas emissions, the use of conventional refrigerants such as hydrofluorocarbon (HFC) is to be prohibited [1,2]. A number of studies have been conducted to figure out possible alternatives to the conventional refrigerants [3,4]. Hydrofluoroolefin (HFO) refrigerants have been nominated as one of the substitute refrigerants owing to their low lifetime at atmosphere [5-8]. However, there still are a lot of the conventional refrigerants of which alternatives have not been developed yet. Therefore, instead of developing novel refrigerants to replace the conventional refrigerants, many researchers have proposed to use refrigerant mixtures which have moderate global warming potential (GWP) with reasonable performance [9,10]. The refrigerant mixtures involve several HFC and HFO refrigerants. Therefore, it is important to estimate the performance of refrigerant mixtures composed of HFC and HFO.

In this study, the characteristics of a binary refrigerant mixture are analyzed in terms of heat transfer performance as well as GWP. The most distinctive feature of the refrigerant mixture is temperature gliding. The difference in the saturation pressure of the two refrigerants at a given temperature is attributed to the temperature gliding, resulting in an increase in the temperature during the evaporation process. Accordingly, the heat transfer coefficient of the refrigerant mixture is affected by the temperature gliding. However, the frictional pressure drop is influenced by the viscosity of the refrigerant rather than the temperature gliding.

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