

A review of refrigerant maldistribution

ABSTRACT

In recent years, conservation of energy has become a challenging issue in air-conditioning applications. In order to overcome this issue, many researchers have recommended the use of a Parallel Flow Condenser and a low Global Warming Potential and Ozone Depletion Potential refrigerant, such as R32, in air conditioning systems. However, PFC faces the critical challenge of flow maldistribution in the tubes. This literature review mainly examines the refrigerant maldistribution problem which has been investigated by previous researchers. It was found that many of the researchers did not properly analyse the influence of flow maldistribution profiles on the performance degradation of heat exchangers. In order to have a comprehensive analysis of tube-side maldistribution in Parallel Flow microchannel heat exchangers, it is recommended that the influence of the higher statistical moments of the probability density function of the flow maldistribution profiles on performance degradation be quantified. Additionally, R32 maldistribution should be analysed and compared with R410A, which is the current commonly used refrigerant in air conditioning units. Moreover, in order to have a realistic simulation of the effect of refrigerant flow maldistribution profiles on performance degradation of heat exchangers, the effect of superheat and sub-cooling must be analysed.

Keywords: Refrigerant maldistribution; Microchannel heat exchangers; Parallel flow condenser