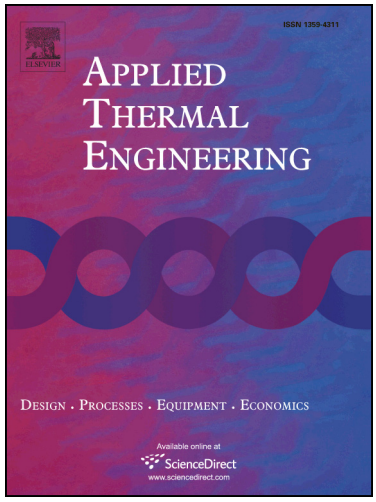

R32 and R410A condensation heat transfer coefficient and pressure drop within minichannel multiport tube. Experimental technique and measurements

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R32 AND R410A CONDENSATION HEAT TRANSFER COEFFICIENT AND PRESSURE DROP WITHIN MINICHANNEL MULTIPORT TUBE. EXPERIMENTAL TECHNIQUE AND MEASUREMENTS.

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ABSTRACT

The present paper reports the construction of an experimental installation to measure local condensing two-phase flow heat transfer coefficient and frictional pressure drop within mini-channel tubes, the validation measurements developed with R134a and the experimental measurements of heat transfer coefficient and frictional pressure drop made with R32 and R410A.

This experimental work is carried out in a test apparatus which allows determining the local heat flux extracted from the condensing fluid. For this purpose, the wall temperature is measured along the test section in several points.

The saturation temperature is determined from the saturation pressure, which is measured at the inlet and the outlet of the test channel.

Experimental data of R32 and R410A are also compared with some predicting models widely accepted in the literature.

Keywords: Experimental, measuring, technique, two-phase flows, minichannels, R410A, R32, R134a

1 INTRODUCTION

Today, miniaturized geometries such as micro and mini-channels are used in many applications related to heat dissipation in many industrial processes. Heat exchangers into the automotive industry, electronics and domestic applications are some examples of this. Because of the advantages of phase change, two-phase flow has been applied to a growing number of fields in recent years because of its higher energy efficiency in comparison with single-phase flow. The refrigerant charge reduction is much related to compactness and this latter is extremely important in new heat pumps and refrigeration systems because of the great contribution of some refrigerant fluids such as HCFC and HFC to the direct greenhouse effect. If natural fluids as hydrocarbons or ammonia are used as refrigerants, the charge reduction is also very important for safety reasons [1].

One of the first authors who studied the variation of heat transfer coefficient as the diameter was reduced were Kays and London [2]. From then on, the investigation on heat transfer and