THEORETICAL AND EXPERIMENTAL STUDY OF AMMONIA CONDENSATION HEAT TRANSFER IN AIR-COOLED MESOCHANNEL HEAT EXCHANGERS

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ABSTRACT

A mathematical model is formulated in this paper for the prediction of the heat rejection rate, assuming that the total heat transfer area of the mesochannel condenser is made up of 2 different areas, corresponding to superheated vapor state and the two-phase flow state. Each of these areas is considered as an independent heat exchanger (Mamani et al., 1999).

Maximum heat rejection rate represents the criteria used in order to optimize the geometrical configuration of the condenser. This theoretical study resulted in an optimized geometrical configuration of the mesochannel condenser (Heun et al., 1996a; Heun et al., 1996b).Experimental research has been carried out using a mesochannel condenser of optimized geometrical configuration.

The authors of the present paper develop a comparative analysis of theoretical vs. experimental heat rejection rate and heat transfer coefficient for an ammonia air-cooled mesochannel condenser.

REFERENCES

[1] AWF, R. A., 1995, *Modeling of condensers, evaporators and refrigeration circuit in automobile air conditioning systems*, Doctoral Thesis, Universidad de Valladolid, Valladolid, Spain.

[2] DITTUS, F. W., and BOELTER, L. M. K., 1930, Heat *Transfer in Automobile Radiators of the Tubular Type*, Publications in Engineering, University of California, Berkeley, CA, Vol.2, p.443.

[3] HEUN,D.,MATTHEW,K.,and DUNN,W.E., , *"Principles of Refrigerant Circuiting with Application to Microchannel Condensers Part I–Problem Formulation and the Effects of Port Diameter and Port Shape,"* ASHRAE Transactions,V.102(2), 1996a, pp.373-381.

[4] HEUN,D.,MATTHEW,K., and DUNN,W.E., *"Principles of Refrigerant Circuiting with Application to Microchannel Condensers: Part II –The Pressure Drop Effect and the Cross-Flow Heat Exchanger Effect,"* ASHRAE Transactions,V.102(2), 1996b, pp. 382-393.

[5] KAKAS, S., 1998, *"Evaporators and condensers for refrigeration and air conditioning systems and their thermal design,"* 3rd International HVAC&R Technology Symposium, Turcia.

[6] KANDLIKAR, S. G, and STEINKE, M. E., 2003, *"Predicting heat transfer during flow boiling in minichannales and microchannales,"* ASHRAE Transactions.