

Accepted Manuscript

Two-phase flow boiling frictional pressure drop of liquid nitrogen in horizontal circular mini-tubes: Experimental investigation and comparison with correlations

Xingya Chen, Shuangtao Chen, Jun Chen, Jiapeng Li, Xiufang Liu, Liang Chen, Yu Hou

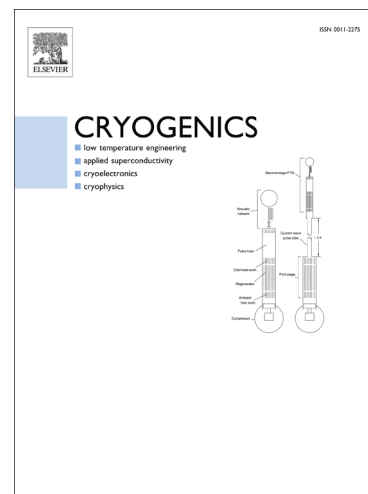
PII: S0011-2275(16)30160-6
DOI: <http://dx.doi.org/10.1016/j.cryogenics.2017.03.002>
Reference: JCRY 2672

To appear in: *Cryogenics*

Received Date: 16 June 2016
Revised Date: 8 March 2017
Accepted Date: 8 March 2017

Please cite this article as: Chen, X., Chen, S., Chen, J., Li, J., Liu, X., Chen, L., Hou, Y., Two-phase flow boiling frictional pressure drop of liquid nitrogen in horizontal circular mini-tubes: Experimental investigation and comparison with correlations, *Cryogenics* (2017), doi: <http://dx.doi.org/10.1016/j.cryogenics.2017.03.002>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Two-phase flow boiling frictional pressure drop of liquid nitrogen in horizontal circular mini-tubes: Experimental investigation and comparison with correlations

Xingya Chen¹, Shuangtao Chen¹ *, Jun Chen², Jiapeng Li², Xiufang Liu¹, Liang Chen¹, Yu Hou¹

¹ State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, Xi'an 710049, PR China

² Kunming Institute of Physics, Kunming 650223, PR China

*Corresponding author, Email: stchen.xjtu@mail.xjtu.edu.cn

Abstract: The two-phase flow boiling characteristics of liquid nitrogen (LN₂) in horizontal circular mini-tubes were experimentally studied. Experiments were performed in a wide range of flow conditions, e.g. inlet pressure from 0.17 to 0.35 MPa, mass flux from 140 to 330 kg/m²s, heat flux from 0.5-69.4 kW/m² and tube diameters of 2.92 mm and 3.96 mm. The influences of mass flux, heat flux, and inlet pressure on the pressure drop were discussed. The results indicated that the pressure drop increases with the increasing mass flux and heat flux but decreases with the increasing inlet pressure. But the influence of heat flux on the frictional pressure drop of LN₂ was weaker than mass flux and inlet pressure. The frictional pressure drop of two-phase flow of LN₂ was compared with homogeneous model and several semi-empirical correlations. An improved correlation based on the Lockhart-Martinelli model, which used coefficient C as a function of Reynolds number and Weber number was proposed.

Keywords: two-phase flow, frictional pressure drop, liquid nitrogen, horizontal circular mini-tube

Download English Version:

<https://daneshyari.com/en/article/5444144>

Download Persian Version:

<https://daneshyari.com/article/5444144>

[Daneshyari.com](https://daneshyari.com)