

Accepted Manuscript

Research Paper

Air adsorption on the gas-liquid interface in vapor condensation across horizontal tube

J.X. Zhang

PII: S1359-4311(17)33675-X

DOI: <https://doi.org/10.1016/j.applthermaleng.2017.09.106>

Reference: ATE 11163

To appear in: *Applied Thermal Engineering*

Received Date: 29 May 2017

Revised Date: 17 August 2017

Accepted Date: 21 September 2017

Please cite this article as: J.X. Zhang, Air adsorption on the gas-liquid interface in vapor condensation across horizontal tube, *Applied Thermal Engineering* (2017), doi: <https://doi.org/10.1016/j.applthermaleng.2017.09.106>

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.



Air adsorption on the gas-liquid interface in vapor condensation across horizontal tube

J.X. Zhang^{a,*}

^a School of Energy Engineering, Yulin University, Yulin 719000, China

* Email: wyb700411@163.com, Tel: 15529952278

Abstract: Air adsorption on the gas-liquid interface in vapor condensation across horizontal tube was investigated experimentally. An air hole with a diameter of 0.006 m was opened at $z = 0.755$ m and $\theta = 50^\circ$ on the jacket tube wall. A total of 16 thermistors were mounted uniformly on the horizontal tube wall along the circumference of $z = 0.27$ m and $z = 0.72$ m to measure wall temperature. The relative air content, ending difference, heat transfer coefficient and Nusselt number were calculated, and the in-leakage air adsorption process on the gas-liquid interface was analysed. The key factors that affect air adsorption on the gas-liquid interface are relative air content, heat load, pressure, and temperature. The air adsorption amount on the gas-liquid interface improves with the increase in relative air content and reduces with the increase in heat load. The air adsorption on the gas-liquid interface in the condensation of vapor over the horizontal tube has a similar change rule as Langmuir's isothermal adsorption law. The air adsorption amount on the gas-liquid interface increases with the increase in pressure and the reduction in temperature. Higher vapor condensation decreases the air adsorption amount on the gas-liquid interface, causing the adsorption equilibrium to move towards desorption. The error between the variation of experimental in-leakage air mass flux with the pressure drop rate and the results from a formula recommended by America Heat Exchange Institute (HEI) is within -28%–23%. The present experimental results were compared with the results of the works of Nusselt (1916), Sherkriladze and Gomelauri (1966), Rose (1984), Fujii et al. (1972) and Chen and Lin (2009).

Download English Version:

<https://daneshyari.com/en/article/4990361>

Download Persian Version:

<https://daneshyari.com/article/4990361>

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