

Accepted Manuscript

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PII: S0894-1777(18)30478-3

DOI: <https://doi.org/10.1016/j.expthermflusci.2018.03.030>

Reference: ETF 9427

To appear in: *Experimental Thermal and Fluid Science*

Received Date: 21 November 2017

Revised Date: 5 March 2018

Accepted Date: 26 March 2018

Please cite this article as: W. Zhao, Z. Song, H. Li, H. Gu, X. Tuo, Y. Zheng, H. Wang, Research on Heat Transfer Characteristics of Kerosene at Supercritical Pressure in Circular Tubes, *Experimental Thermal and Fluid Science* (2018), doi: <https://doi.org/10.1016/j.expthermflusci.2018.03.030>

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Research on Heat Transfer Characteristics of Kerosene at Supercritical Pressure in Circular Tubes

Wenzhe Zhao^{1,2}, Zichen Song¹, Hongzhi Li³, Hongfang Gu¹, Xiaobing Tuo¹, Yulong Zheng¹, Haijun Wang^{1*}

1. State key laboratory of multiphase flow on power engineering, Xi'an Jiaotong University, 710049, Xi'an, China;
2. Shanghai Engineering Center for Microsatellites, 200120, Shanghai, China;
3. Xi'an Thermal Power Research Institute Co. Ltd, Xi'an, 710032, China

* corresponding author: whj@mail.xjtu.edu.cn

Abstract: Understanding the heat transfer characteristics of supercritical kerosene is significant for the corresponding engineering design, and the special properties of supercritical fluids make the heat transfer more complicated. In this article, the heat transfer characteristics of kerosene under the condition of supercritical pressure, high heat flux and high velocity were investigated and analyzed. The experimental results show that with the increase of flow velocity and inlet temperature at supercritical pressure, the heat transfer coefficient of kerosene increases and the pressure has little effect on the heat transfer coefficient. Experiment shows that when the inlet temperature is high, coking phenomenon may occur to affect heat transfer. Considering the particularity of the properties of supercritical kerosene and its violent changes of physical parameters in the flow space, dynamic viscosity and thermal conductivity were introduced to modify the traditional kerosene heat transfer correlation. Simultaneously taking the changes of the physical properties of kerosene in time dimension into consideration, the temperature probability density function (PDF) was introduced to obtain the time average physical property from the perspective of probability and statistics. The results show that when the inner wall temperature exceeds 400°C, the kerosene heat transfer correlation with radial

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