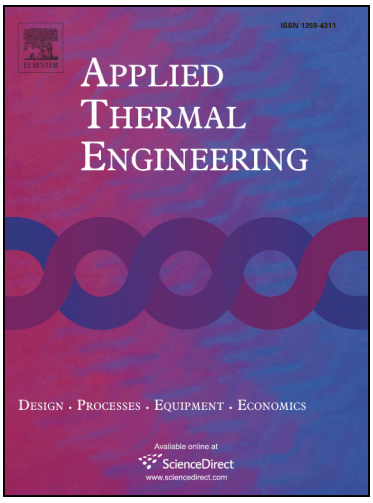
Accepted Manuscript



Research Paper

Experimental Study for Shell-and-Tube Molten Salt Heat Exchangers

Jin Qian, Qiao-Ling Kong, Hong-Wu Zhang, Zhi-Hong Zhu, Wei-Guang Huang, Li Wen-Hui

PII: S1359-4311(17)30279-X
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2017.06.005
Reference: ATE 10523

To appear in: *Applied Thermal Engineering*

Received Date: 13 January 2017
Revised Date: 4 May 2017
Accepted Date: 3 June 2017

Please cite this article as: J. Qian, Q-L. Kong, H-W. Zhang, Z-H. Zhu, W-G. Huang, L. Wen-Hui, Experimental Study for Shell-and-Tube Molten Salt Heat Exchangers, *Applied Thermal Engineering* (2017), doi: http://dx.doi.org/10.1016/j.applthermaleng.2017.06.005

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.

ACCEPTED MANUSCRIPT

Experimental Study for Shell-and-Tube Molten Salt Heat Exchangers

QIAN Jin[1,2], KONG Qiao-Ling[3,4], ZHANG Hong-Wu[1], ZHU Zhi-Hong[3,4], HUANG Wei-Guang[3,4], Li Wen-Hui[3,4]

(1. Institute of Engineering Thermophysics, CAS, Beijing 100190, China;

2. University of Chinese Academy of Sciences, Beijing 100049, China;

3. Shanghai Advanced Research Institute, CAS, Shanghai 201210, China;

4. Institute of Innovational and Advanced Nuclear Power, CAS, Shanghai 201800, China)

Abstract: Molten salt heat exchangers are key components in some advanced power systems. Two shell-and-tube molten salt heat exchangers are experimentally investigated, including a gas cooled one with finned tubes and a molten salt to salt one with segmental baffles in the shell side. Based on a nonlinear regression scheme, heat transfer coefficients in both the tube and shell sides are obtained. Heat transfer characteristics of molten salt in the tube side are discussed and compared with three empirical correlations. It is found that Wu's Equation has better agreement with the experimental data than Gnielinski's and Hausen's Equations in transitional flow region. For the developing laminar flow in the tube side, the widely used Sieder–Tate correlation underestimates heat transfer coefficients of molten salt by up to 30%. Compared with oil and a chart method proposed from sufficient database, molten salt seems to have better heat transfer performance than other working fluids in the baffled shell side. Further researches on the heat transfer characteristics of molten salt in the shell side with baffles are needed and significant.

Keywords: molten salt; shell-and-tube heat exchanger; heat transfer characteristics; experimental investigation

Corresponding author: QIAN Jing, qianjin@iet.cn

1 Introduction

Molten salts are recognized as potential heat transfer fluids in nuclear[1, 2] and solar[3, 4] applications, since they have excellent advantages[5], including large volumetric heat capacity, high boiling point, low vapor pressure and high thermal stability. Several advanced power systems[6, 7] have been developed to produce very high temperature heat for more

Download English Version:

https://daneshyari.com/en/article/4990647

Download Persian Version:

https://daneshyari.com/article/4990647

Daneshyari.com