

Accepted Manuscript

Experimental and analytical study of the overall heat transfer coefficient of water flowing through a single fracture in a granite core

Bing Bai, Yuanyuan He, Xiaochun Li, Jun Li, Xiaoxue Huang, Jialing Zhu

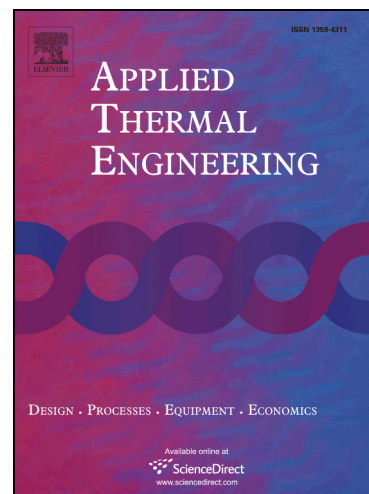
PII: S1359-4311(17)30128-X
DOI: <http://dx.doi.org/10.1016/j.applthermaleng.2017.01.020>
Reference: ATE 9784

To appear in: *Applied Thermal Engineering*

Received Date: 21 July 2016
Revised Date: 1 January 2017
Accepted Date: 7 January 2017

Please cite this article as: B. Bai, Y. He, X. Li, J. Li, X. Huang, J. Zhu, Experimental and analytical study of the overall heat transfer coefficient of water flowing through a single fracture in a granite core, *Applied Thermal Engineering* (2017), doi: <http://dx.doi.org/10.1016/j.applthermaleng.2017.01.020>

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.



Experimental and analytical study of the overall heat transfer coefficient of water flowing through a single fracture in a granite core[†]

Bing Bai^{a,*}, Yuanyuan He^a, Xiaochun Li^a, Jun Li^{b,c}, Xiaoxue Huang^{b,c}, Jialing Zhu^{b,c}

^a State Key Laboratory of Geomechanics and Geotechnical Engineering, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences, Wuhan 430071, China

^b Key Laboratory of Efficient Utilization of Low and Medium Grade Energy, Ministry of Education, Tianjin University, Tianjin 300072, China

^c Tianjin Geothermal Research and Training Center, School of Mechanical Engineering, Tianjin University, 92 Weijin Road, Nankai District, Tianjin 300072, China

ABSTRACT:

An experimental and analytical study was conducted to improve the understanding of the heat transfer characteristics between flowing water and granite. A systematic experimental study of water flow and heat transfer through a single fracture in a well-characterized granite specimen was performed under confining pressures of 0, 3 and 6 MPa and confining temperatures of 70, 80, 90 and 100 °C. Based on the test data, four existing formulas of the overall heat transfer coefficient (OHTC) were evaluated. Compared to other formulas that may predict abnormal OHTC values (extremely large or negative values), Formula D and the newly proposed Formula E were suitable indicators of the OHTC under our experimental conditions. The proposed method is recommended because of its rigorous theoretical basis, concise form and effective prediction results. Based on the proposed formula, we found that OHTCs were positively correlated with flow rates. However, wider fracture apertures resulted in smaller OHTCs, suggesting that wider apertures decrease the heat transfer efficiency. Additionally, most of the slopes of the OHTC-aperture curves were similar. Finally, we investigated the conditions for which OHTC formulas produced abnormal values.

[†]Correspondence to Bing Bai
E-mail: bai_bing2@126.com

Download English Version:

<https://daneshyari.com/en/article/4991422>

Download Persian Version:

<https://daneshyari.com/article/4991422>

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