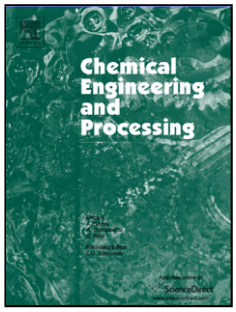

Title: Parametric study of heat transfer enhancement on cross-flow heat exchangers

Author: X.J. Luo

PII: S0255-2701(17)30011-9
DOI: http://dx.doi.org/doi:10.1016/j.cep.2017.07.014
Reference: CEP 7033

To appear in: *Chemical Engineering and Processing*

Received date: 8-1-2017
Revised date: 17-6-2017
Accepted date: 14-7-2017

Please cite this article as: X.J.Luo, Parametric study of heat transfer enhancement on cross-flow heat exchangers, Chemical Engineering and Processinghttp://dx.doi.org/10.1016/j.cep.2017.07.014

Parametric study of heat transfer enhancement on cross-flow heat exchangers

X.J. Luo*

Department of Architecture and Civil Engineering, College of Science and Engineering, City University of Hong Kong

*Corresponding author

Email address: xjluo3-c@my.cityu.edu.hk

Postal address: 8 Tat Chee Avenue, Kowloon Tong, Hong Kong, China

Highlights

- Theoretical mathematical models were constructed for heat exchangers with external and internal recycles.
- Effects of recycle ratio, capacitance ratio and heat transfer area were investigated.
- The maximum increase of efficiency reach up to 28% and 21% for internal and external recycles

Abstract:

Energy crisis is increasingly serious all over the world, therefore, energy saving and efficiency enhancement is on the focus. Technology in heat transfer enhancement, which can improve efficiency of heat exchangers, is always attached importance to by scientists and engineers. Heat exchangers with recycle means a part of worked fluid is delivered by a pump to the inlet port and mixed with incoming working fluid to achieve larger convective heat transfer coefficient.

In this research, cross-flow heat exchangers with external and internal recycles were investigated in the laminar regime respectively. Mathematical models of heat exchangers were established to study its thermo-hydraulic performances. The effects of recycle ratio, capacitance rate ratio and heat transfer area were investigated. The results demonstrate that the dimensionless heat transfer rate rises with the increase of recycle ratio R or capacitance rate ratio C_2/C_1, or with the decrease of heat transfer area A. The maximum increase of efficiency reached up to 28% and 21% for internal and external recycles, respectively.

Keywords: Internal/external recycle; Heat exchanger; Mathematical model; Laminar flow; Thermo-hydraulic performance.

Nomenclature