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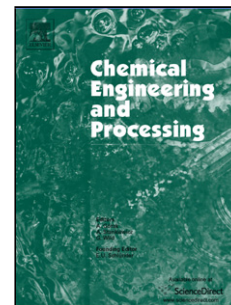
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Parametric study of heat transfer enhancement on cross-flow heat exchangers

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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

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