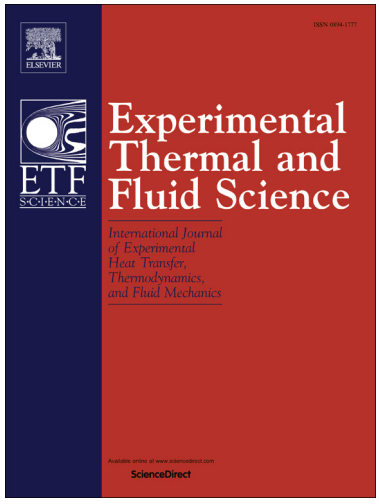

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PII: S0894-1777(16)30127-3
DOI: http://dx.doi.org/10.1016/j.expthermflusci.2016.05.011
Reference: ETF 8777

To appear in: *Experimental Thermal and Fluid Science*

Received Date: 26 March 2016
Revised Date: 12 May 2016
Accepted Date: 12 May 2016

Please cite this article as: A. Moosavi, M. Abbasalizadeh, H.S. Dizaji, Optimization of heat transfer and pressure drop characteristics via air bubble injection inside a shell and coiled tube heat exchanger, *Experimental Thermal and Fluid Science* (2016), doi: http://dx.doi.org/10.1016/j.expthermflusci.2016.05.011

Optimization of heat transfer and pressure drop characteristics via air bubble injection inside a shell and coiled tube heat exchanger

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Abstract: Most recently, a couple of academic investigations have focused on air bubble injection (with a constant air flow rate) inside the shell-and-coiled-tube heat exchangers in order to increase the performance and effectiveness of these heat exchangers. However, the amount of air flow rate has great effects on these applications which have not been probed in previous studies. Moreover, in former papers, air flow has been injected inside the only shell side and not coil side of heat exchanger. Hence, in this experimental research, air bubbles is flowed inside the shell or coil side of heat exchanger with variant air flow rates to detect an optimum condition and also fill out this topic. Air flow rate was changed between 1LPM and 5LPM. Coil side water flow rate was kept at 1LPM (inlet temperature of 40 ^{0}C) and shell side water flow rate was varied between 1LPM and 5 LPM (inlet temperature of 15^{0}C). Furthermore, pressure drop due to bubble injection is measured in this paper for aforesaid heat exchangers as another new parameter. Observations showed that the air flow rate and injection side (shell and coil) play key roles on the effect of bubble injection into the heat exchangers. Findings showed that, increment of air flow rate causes enhancement of overall heat transfer coefficient. Air injection into the shell side of the heat exchanger increased the overall heat transfer coefficient 6-187% depending on air flow rate.

***Keywords*:** Air bubble injection, Different flow rate, Overall heat transfer coefficient, Pressure drop, Effectiveness