

Contribution to thermo fluid modelling of micro heat exchangers using the dimensional analysis

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Abstract: Due to its variety of advantages offered, the progress of the studies on micro devices used in chemical analysis is observed. The micro heat exchangers are well recognized for their higher performance. The applications of them are ranging from increasing of heat transfer applications to chemical reactions or evaporation of liquids applications. The current paper is addressing an engineering approach for modelling the heat and mass transfer processes in micro heat exchangers. The approach is based on the dimensional analysis and principles of theory of similitude that allow the modelling of microscale systems using a physical system at miniscale. There are identified constant relationships between dimensions permitting the analysis of the fluid flow through micro channels, taking into account the differences between fluid flow through micro and mini channels. The velocity scale ratio is in inverse ratio to length scale and similar, it is modified the accelerations scale. The pressure drop is higher with smaller channel dimensions. In this study the interfacial effects are neglected.

Keywords: fluid flow modelling, micro heat exchanger, dimensional analysis, similitude theory.
