Contribution ID: **186** Type: **Oral presentation (15min)**

Performance Evaluation of Heat Tranfer Enhancement in Plate-Fin Heat Exchangers with Offset Strip Fins

Thursday, 10 July 2014 16:45 (15 minutes)

Generally, an Offset Strip Fin (OSF) used in a plate-fin heat exchanger is able to provide a greater heat transfer coefficent than a plain plate-fin with the same cross section and channel length, but it also leads to an increase in flow friction and pressure drop owing to the fin offset. A new parameter, called relative entropy generation distribution factor, Ψ+, is proposed in this paper to comprehensively reflect the thermodynamic advantages and disadvantages of different passage structures in plate-fin heat exchanger. This parameter physically presents a ratio of relative changes of entropy generation and irreversibility, where the former is reduced by heat transfer enhancement and the later is increased by higher friction loss due to the utilization of offset strip fins. The high magnitude of Ψ+ represents a beneficial contribution of OSF with a higher degree of the heat transfer enhancement. The proposed method is more reasonable and comprehensive than either the traditional augmentation entropy generation number, Ns,a, or the entropy generation distribution factor, Ψ, to evaluate the heat transfer enhancement for OSF cores subject to various operating conditions. With the proposed method, the relative effects of the geometical parameters of offset strip fins, such as the fin thickness-to-height ratio α, fin density β, and fin thickness-to-length ratio γ, on the heat transfer enhancement are discussed in detail. The results show that there exist optimal dimensionless parameters α and β , which can maximize the degree of heat transfer enhancement of OSF fins for a given operating constraint, while the influence of the ratio γ is relatively monotonic.

Primary author: Mr YANG, Yujie (Xi'an Jiaotong University)

Co-authors: Mr SI, Biao (Xi'an Jiaotong University); Mr ZHENG, Jieyu (Xi'an Jiaotong University); Prof. LI, Yanzhong (Xi'an Jiaotong University)

Presenters: Prof. LI, Yanzhong (Xi'an Jiaotong University); Mr YANG, Yujie (Xi'an Jiaotong University)

Session Classification: Thu-Af-Orals Session 18

Track Classification: C-06: Heat transfer and thermo-physical properties of solids and fluids