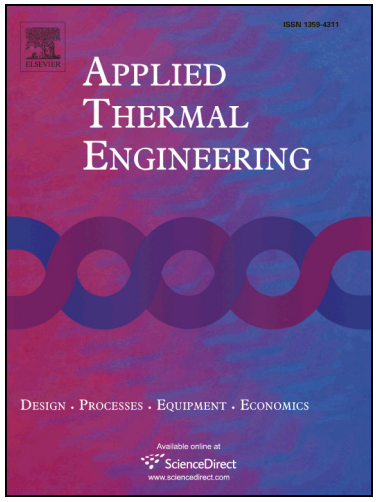

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Thermodynamic and geometrical characteristics of mixed convection heat transfer in the shell and coil tube heat exchanger with baffles.

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Abstract The article presents passive heat transfer enhancement method in the form of baffles to increase the energy efficiency of the shell coil heat exchanger. Conducted literature review shows that, despite numerous studies, there is little work on the intensification of heat transfer at the shell side. Most of the work focuses on the impact of geometrical parameters of the coil itself. This article successfully proves that it is possible to increase the efficiency of heat exchange in the heat exchanger shell type coil with baffle inserts. This work shows that, due to the presence of mixed convection, natural convection has a significant effect for small values of Reynolds numbers and large heat flux. Also, the baffle and inlet configuration have a high impact on results. Presented simple experimental correlation gives a satisfactory compliance with experimental results. It should be noted that the correlation can be applied for all of the presented heat exchanger configurations.

Keywords: shell coil heat exchanger; baffles; heat transfer enhancement; HTC;

1. Introduction

Heat exchangers are considered to be very important in systems of energy generation and energy transformation in many industrial applications such as power plants [1], refrigeration and air-conditioning systems [2,3], heat recovery systems [4], chemical processing and food industries [5]. Extensive use of heat exchanger in industries necessitates not only performance but also the size of the heat exchanger [6]. Hence the selection of proper heat transfer enhancement technique has a prime importance [7,8]. In industrial applications, various techniques are used for heat transfer enhancement. These techniques are classified into two groups: active and passive techniques [9]. The techniques which require external forces for