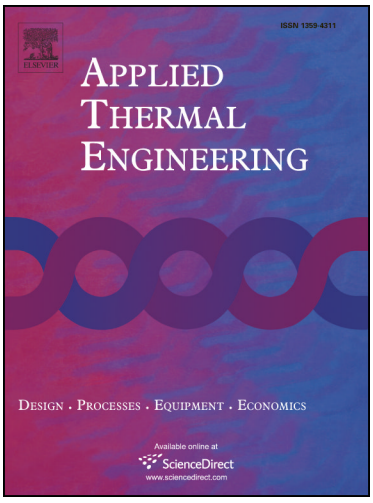

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Design and performance analysis of the novel shell-and-tube heat exchangers with louver baffles

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Abstract

Two novel shell-and-tube heat exchangers with louver baffles are invented and designed for energy conservation. A certain amount louver baffles at the inclination angle between shell side flow direction and louver baffle are equipped in shell side to support tube bundles. Numerical simulations are carried out to investigate the thermo-hydraulic performance of the two reformed shell-and-tube heat exchangers with louver baffles. For comparison, a shell-and-tube heat exchanger with conventional segmental baffles also studied in the paper. Fluid flow structures and temperature distributions are presented for the analysis of the physical behavior of fluid flow and heat transfer. Oblique flow is produced in the shell side of the shell-and-tube heat exchangers with louver baffles that decrease and eliminate the dead spaces and augment the local heat transfer. Compared with the shell-and-tube heat exchanger with segmental baffles, abrupt change of fluid flow is avoided that decrease the pressure drop in the shell side. The numerical results indicated that the heat transfer coefficient per pressure drop of both the shell-and-tube heat exchangers with louver baffles are higher than that of the shell-and-tube heat exchanger with segmental baffles. This implies that at the same heat transfer quantity, the pumping power of the shell-and-tube heat exchangers