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Experimental and Numerical Investigation of Heat Transfer in THTL Test Loop Shell and Tube Heat Exchanger

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Abstract : In this study, flow inside the shell side of a shell-and-tube heat exchanger is simulated numerically for laminar and turbulent flows in both steady state and transient mode. Governing equations of fluid flow are discrete using finite volume method and central difference scheme and solved with simple algorithm which is staggered grid by using MATLAB programming language. The heat transfer coefficient is obtained using velocity field from equation Dittus-Bolter. In comparison with, heat exchanger is simulated with ANSYS CFX software and experimental data measured in the THTL test loop. Numerical results obtained from the study show good agreement with experimental data and ANSYS CFX results. In addition, by deliberation the effect of the baffle spacing and the baffle cut on the heat transfer rate for turbulent flow, it is illustrated that the heat transfer rate depends on the baffle spacing and the baffle cut directly. In other word in spied of large turbulence, if these two parameters are not selected properly in the heat exchanger, the heat transfer rate can reduce.

Keywords : shell-and-tube heat exchanger, flow and heat transfer, laminar and turbulence flow, turbulence model, baffle spacing, baffle cut

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