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DEVELOPMENT OF NUMERICAL TOOLS FOR SHELL-AND-SHELL THERMOSYPHON HEAT EXCHANGER DESIGN

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Abstract

Thermosyphon heat exchangers are efficient equipment used in many industrial applications, such as petrochemical plants. To be employed in offshore petroleum exploration platforms, these equipments must be as compact and as light as possible. The main objective of the present paper is to calibrate thermosyphon shell and shell heat exchanger designing tools used for proposing efficient compact equipment. A selected heat exchanger (for petroleum platform exploration) was taken as the "study case". A computational algorithm, developed at the Heat Pipe Laboratory (Labtucal), at Federal University of Santa Catarina (UFSC), was employed in this study. This tool couples the Bell-Delaware method and the equivalent two-phase thermosyphon thermal resistance model for the heat exchanger design. The external fluid flow numerical simulations were performed for the shell and shell heat exchanger condenser and evaporator. Baffle cuts of different sizes were proposed and the thermal performance of the resulting equipment were compared, and the best configuration was identified. The comparison of the resulting data shows that both methods, literature and numerical, present similar outcomes. As a major conclusion, one can say that the software developed at Labtucal can be considered precise for the design of thermosyphon heat exchangers.