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SCIENTIFIC & RESEARCH PROJECTS

Project No.: 02 **Year:** 1991

Project Field: Heat Exchanger Networks (HENs)

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Project Title:

Rapid Design Algorithms for Shell-and-tube and Compact Heat Exchangers

Abstract:

Computed aided design of heat exchangers has now reached a high level of sophistication. For instance, in the case of shell-and-tube units state-of-the-art programs typically contain models which attempt to model the flow through the exchanger shell, bundle vibration analyses, and even important elements of mechanical design. This sophistication is bought at a price. The designer must make a number of subjective decisions before he is able to use such programs. These decisions typically involve the specification of shell type, tube size and pitch, tube bundle layout and baffle type. In this paper, algorithms for the rapid sizing of exchangers are presented. By using these algorithms the designer can make these important decisions on a much more objective basis. Algorithms are presented for both shell-and-tube heat exchangers and for compact exchangers. They are based on full use of allowable pressure drops of both of the streams being contacted. Both algorithms are tested using problems taken from existing literature. In the case of shell-and-tube exchanger algorithm, it is assumed that the best shell side performance can be gained by making baffle window flow velocities and bundle cross flow velocities equal. This in turn leads to a 'similarity concept' which can be used for the derivation of simple performance equations from today's sophisticated shell side models.