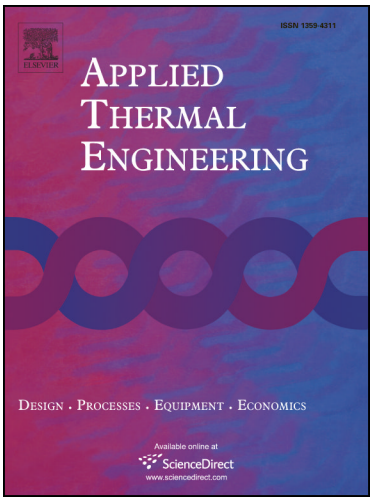

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Synthesis of multiperiod heat exchanger networks with timesharing mechanisms using meta-heuristics

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Abstract Plants with cyclical variations in operating conditions require multiperiod heat exchanger networks (HEN) able to perform heat integration efficiently in all those periods. In such cases, however, overdesign issues arise, *i.e.*, a heat exchanger might be too large for the service it must perform in a given period, requiring fractions of the process streams to by-pass such units. In this work, timesharing mechanisms (TSM) are considered for circumventing such issues, which means heat exchanger services are not fixed throughout the different periods of operation and a single piece of equipment can perform heat integration between different pairs of streams in each cycle. Two schemes are considered with the present meta-heuristic approach to obtain a preliminary solution before applying the service switching concepts. Then, systematic service rearrangement and equipment re-sizing in a new optimization stage are performed in order to find areas more suitable for the different timesharing arrangements. The latter is a new proposed model, not present in previous works that consider timesharing schemes. Four cases from the literature were investigated and results with lower total annual costs (TAC) than those reported previously by other works were achieved.

Keywords: optimization; multiperiod heat exchanger networks; meta-heuristics

1 Introduction

The study and design of heat exchanger networks (HEN) capable of operating not only under fixed nominal process conditions, but also under seasonal variations or critical scenarios, have been an important branch of HEN synthesis research. The multiperiod HEN synthesis problem considers finite

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