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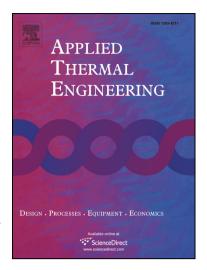
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Synthesis of multiperiod heat exchanger networks with timesharing mechanisms using meta-

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

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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