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Optimal heat exchanger network synthesis based on improved cuckoo search via Lévy flights

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Highlights:

- A NLP for optimal heat load distribution is solved by a Cuckoo Search Algorithm
- An Improved Cuckoo Search Algorithm is proposed for optimal HENS
- An efficient stream arrangement strategy is used to depress the demand of stages
- Four benchmark cases are solved with a lower TAC compared with previous methods
- A special characteristic from two case studies is analyzed to lower the TAC

Abstract: Heat Exchanger Network Synthesis (HENS) is still a challenging task for minimizing the Total Annual Cost (TAC). In this work, a Cuckoo Search Algorithm (CSA) is introduced to solve the NonLinear Programming (NLP) problem of the fixed heat exchanger network design to determine the optimal heat load distribution, which can help improve the heat load configurations of previously found optimum configurations. The Improved CSA (ICSA) is used to solve the Mixed Integer NonLinear Programming (MINLP) problem for optimal HENS, which can simultaneously optimize continuous and integer variables, and the proposed stream arrangement strategy aims to optimize the stream match search space by lowering the

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