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# **A collaborative optimization method for heat transfer systems based on the heat current method and entransy dissipation extremum principle**

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## **Highlights**

- Proposed a collaborative optimization algorithm for HTS optimization.
- Build the heat current model to describe the global heat transfer laws of HTS.
- Optimize convective heat transfer processes with CFD-based simulation and EDEP.
- Integrate two parts with an iteration and updating strategy for accurate results.
- The collaborative optimization is better than separated optimization of the HTS.

## **Abstract**

Optimization of the heat transfer system (HTS) plays an important role in energy utilization fields. However, two aspects of HTS optimization: local optimization for components and system global optimization, are generally performed independently, thus a combination of them is required. This contribution proposes a collaborative optimization strategy for HTS and minimizes the total pumping power consumption for a typical HTS. The global optimization employs the heat current method to derive global optimum results without redundant intermediate variables, and the local optimization applies the CFD-based simulation and the entransy dissipation extremum principle which obtains the optimum flow field directly. Besides, these two parts are

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