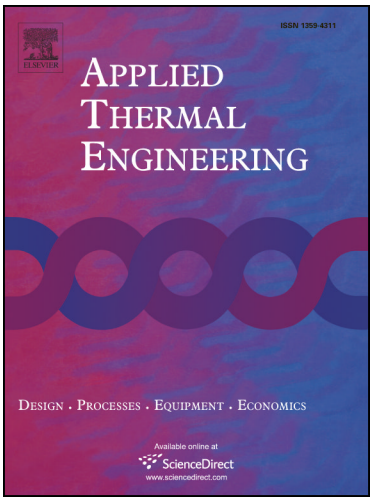

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Abstract

To optimize the controlled variable of counter flow heat exchanger, *T-Q* diagram inducing entropy angle and thermal capacity angle is used to analyze heat exchange process. The results show that selecting stream outlet temperature as controlled variable is incapable of perceiving overall variation of thermal capacity flow rates. The change of heat exchanger effectiveness ε isn't completely consistent with heat transfer irreversibility, and cannot reflect the effect of remanent (flow-imbalance) irreversibility. The terminal temperature difference imposed by heat transfer irreversibility $N_{s,\Delta T}$ is the same at both ends. However, the remanent irreversibility $N_{s,imb}$ makes the terminal temperature difference of one end deviate from the other. Based on maximizing the heat exchange amount and minimizing the irreversible loss, a new controlled variable τ named as heat exchanger comprehensive effectiveness is constructed, which is easy to be measured and calculated. It can reflect the effect of heat exchanger effectiveness, remanent