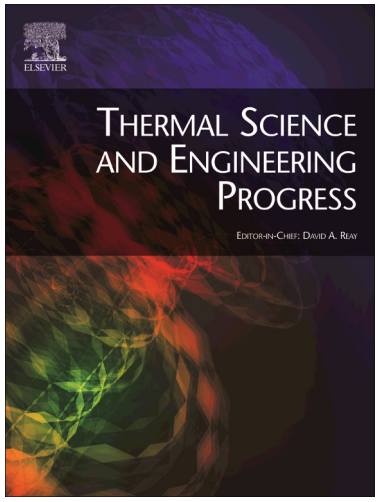

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Thermoeconomic modeling and multi-objective evolutionary-based optimization of a modified transcritical CO_2 refrigeration cycle

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ABSTRACT

In this study, thermoeconomic optimization is applied to a modified transcritical (CO_2) refrigeration cycle. Modified cycle includes an extraction of saturated vapor as a coolant stream from the separator feed to the intercooler. In order to perform multi criteria optimization two objective functions consist of cooling capacity and annual cost rate are chosen. Gas cooler temperature (T_{gc}), gas cooler pressure $(\mathrm{P}_{\mathrm{gc}})$, extraction mass flow rate (α) and evaporator temperature $(\mathrm{T}_{\mathrm{ev}})$ are selected as decision variables based on parametric study. The thermodynamic and economic modeling of the system is performed. To determine analytical, objective functions GMDH (group method of data handling) neural network method is used and finally with a developed code in Matlab optimal values of decision variables have been obtained. In addition, to better understanding the change of decision variables in optimum point, the scatter distribution of these variables is carried out.

Keywords: Carbon dioxide, transcritical refrigeration cycle, multi objective optimization, thermoeconomic analysis

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