Exergoeconomic performance optimization for a combined cooling, heating and power generation plant with an endoreversible closed Brayton cycle

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Abstract
Finite time exergoeconomic performance of a combined cooling, heating and power generation (CCHP) plant composed of one endoreversible closed Brayton cycle and one endoreversible four-heat-reservoir absorption refrigeration cycle is investigated by using finite time thermodynamics. Heat conductance distribution among hot-, cold-, thermal consumer-, generator-, absorber-, condenser- and evaporator-side heat exchangers and compressor pressure ratio are optimized by taking the maximum profit rate as objective. Numerical examples show that there exists a sole group of optimal heat conductance distribution among hot-, cold-, thermal consumer-, generator-, absorber-, condenser- and evaporator-side heat exchangers and an optimal compressor pressure ratio which lead to the maximum profit rate. The effects of design parameters on the optimal performance of the CCHP plant are discussed.

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1. Introduction
In recent years, a great deal of attention has been paid to energy and environmental problems. For this theme, a plant which is energy saving and environmentally friendly is what people chases for. The combined cooling, heating and power generation (CCHP) plant is a system that makes full use of different forms of energy (including cooling, heating and power generation) on the basis of energy cascade utilization principle. It has an excellent cycle performance, a higher energy integrated utilization rate, and a lower CO₂ emission in exhaust gas. Therefore, people begin to pay a great deal of attention to it.