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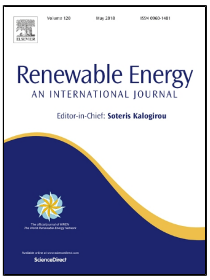

A new flexible geothermal based cogeneration system producing power and refrigeration

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A new flexible geothermal based cogeneration system producing power and refrigeration

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Abstract

A new cooling/power cogeneration system is proposed, analyzed and optimized from the viewpoints of thermoeconomics. The system uses geothermal water as a heat source and ammonia-water solution as a working fluid. It is an internally interacting combination of a modified Kalina and an absorption refrigeration cycles. A sensitivity analysis is performed to assess the influences of important parameters on the exergeoconomic performance of the system prior to optimizing its performance. It is shown that the mass flow division at the condenser exit plays an important role on the system performance. The optimization is performed for maximum exergy efficiency (case1), and minimum total product unit cost (case2). The results show that the total product unit cost for case 2 is around 17% lower than that for case 1 at the expense of 11.8% reduction in the second law efficiency. Similarly, it is observed that the second law efficiency for case 1 is around 13.4% higher than that for case 2 at the expense of 20.52% increase in the total product unit cost. It is found that, under studied conditions, the highest exergy efficiency and the lowest total product unit cost for system are obtained as 34.8% and $24.5/GJ, respectively.

Keywords: Combined cycle; Thermoeconomic analysis; Ammonia-water; Geothermal; cogeneration; Optimization

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