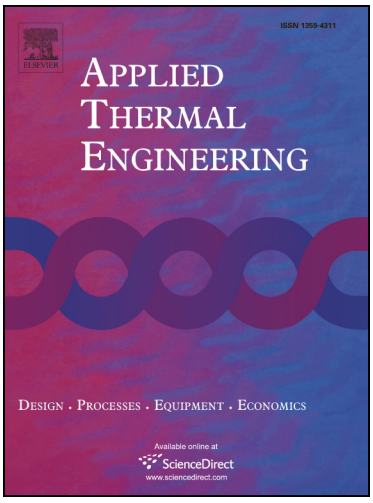

Research Paper

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Exergetic and Exergoeconomic Studies of Two Highly Efficient Power-Cooling Cogeneration Systems Based on the Kalina and Absorption Refrigeration Cycles

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Abstract

Recent technological developments have made it possible to generate power and cooling using the Kalina cycle (KC) through low grade heat sources utilization. The Kalina cooling-power cycle (KPCC) and Kalina LiBr-H_2O absorption chiller cycle (KLACC) are two novel cases that have been proposed and analyzed with regard to their energetic and economic aspects. These systems combine the KC with NH_3-H_2O and LiBr-H_2O absorption chillers, respectively. Having obtained the energy analysis results, exergy analysis is performed to analyze and compare the systems. A comparative exergoeconomic assessment is performed to obtain the unit cost of power-cooling generation. The exergetic analysis demonstrated total exergy destruction of KLACC is 40% higher than KPCC where major exergy destruction occurs in both condenser and second flash tank preheater. The KLACC exergetic efficiency is almost same as the KC although it is higher for KPCC system by 6.8%. According to the exergoeconomic analysis, the unit cost of power-cooling generation for KPCC is 20.5% lower than KLACC; therefore, KPCC performance is better than KLACC. The significant exergy destruction locations to optimize the system performance are the absorber in KPCC and second condenser in KLACC.