Thermodynamic Analysis of an Ejector-Flash Tank-Absorption Cooling System

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Abstract

The performance of a combined ejector-absorption cooling cycle has the potential for further investi-gation. Improving the performance of the system can be achieved by adding a flash tank to the combined cycle. In this study, an analysis based on the second law of thermodynamics is used to evaluate the cyclebefore and after modification. A mathematical model is developed to calculate the entropy generation in each component and the total entropy generation of the system, as well as to evaluate the exergy losses.Underoperating conditions that match the ambient conditions and a certain application in Malaysia (Tgen¼5C;Tcond¼Tabs¼30C; andTevp¼0C), the coefficient of performance (COP) and exergetic efficiency (COPexe) values before and after modification are (0.844, 0.875) and (0.459, 0.476), respectively.The maximum exergy loss is found in the evaporator in both cycles, followed by the condenser and the absorber. A statisticalt-test is carried out to establish the significance of the differences in the COP andthe COP exe before and after modification. It is found that there is significant improvement in combined cycle performance after modification. Overall, adding the flash tank to the combined cycle can be considered a novel enhancement.

Keywords : Combined ejector-absorption cooling cycle, Modification by adding flash tank Mathematical analysis Exergetic efficiencyStatistical, T-test

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