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Energy and exergy analysis of a combined power and refrigeration cycle by applying low temperature heat source

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Abstract

A thermodynamic study and optimization of a combined organic Rankine cycle (ORC) and the ejector refrigeration cycle driven by low-temperature waste heat, is investigated in this paper. With a fixed power/refrigeration ratio, the effects of the various operating conditions, including heat source temperature, evaporator temperature, turbine extraction ratio and turbine and pump inlet pressures, on the cycle performance are examined. The results indicated that the turbine inlet pressure can be optimized to get a minimum thermal conductance amount. Moreover, the combined exergy efficiency decreases with the increasing evaporator and heat source temperatures. Thermal efficiency of the cycle, increases with the heat source temperature increase, pump inlet pressure and extraction ratio of the turbine decrease.

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