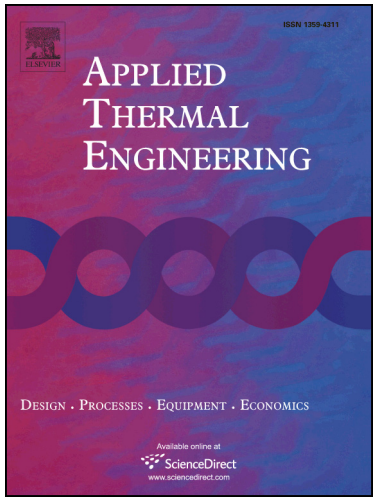

Performance analysis and working fluid selection for ejector refrigeration cycle

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Performance analysis and working fluid selection for ejector refrigeration cycle

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Abstract

A one-dimensional model for an ejector refrigeration cycle driven by low-grade thermal energy was developed. Numerous working fluids were proposed and evaluated to identify the most suitable one. A constant-pressure mixing process is assumed to occur inside the constant-area section of the ejector. The physically based BACKONE equation of state is used to calculate the thermodynamic properties of the candidates. The cycle performance is characterized by the coefficient of performance (COP), while ejector behavior is described by entrainment ratio (ω) and ejector area ratio (EAR). A parametric investigation of the effects of various operating parameters such as the generator, the evaporator and the condenser temperatures on the ejector behavior and cycle performance is carried out for all candidates. The model results showed good agreement with the corresponding experimental data from the literature, where the relative deviations are within ±2.0% and ±7.5% for COP and EAR, respectively. The results show that R245ca is the best among all the candidates from the viewpoint of thermodynamic. However, its environmental and safety aspects should attract more attention. The maximum COP and the corresponding ω as well as the required EAR using R245ca are 0.74, 0.99 and 16.23, respectively at a condenser temperature of 25 ºC and the reference values for the remaining parameters.