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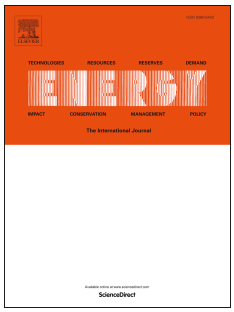

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Optimized liquid-separated thermodynamic states for working fluids of organic Rankine cycles with liquid-separated condensation

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Abstract: Liquid-separated condensation is an emerging enhanced heat transfer method that simultaneously increases the condensation heat transfer coefficient and reduces the pressure drop. This method was applied to shell-and-tube condensers used in organic Rankine cycle systems. The optimized liquid-separated thermodynamic states of organic fluids which maximize the average condensation heat transfer coefficients were studied for the single-stage and two-stage liquid-separated condensations. Effects of the heat exchange tube diameter, organic fluid mass flux and cooling water temperature rise on the optimized liquid-separated thermodynamic states and heat transfer enhancement effects were also analyzed. Results show that the minimized condenser area decreases by 10.2%–18.1% for the single-stage liquid-separated condensation and 14.5%–25.0% for the two-stage, compared to the conventional condensation. Optimized liquid-separated thermodynamic states of nine organic fluids were also obtained. Reducing the heat exchange tube diameter, organic fluid mass flux and cooling water temperature rise, the decrement in the condenser area increases. Increasing the liquid-separation stage is beneficial for reducing the

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