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## **Thermodynamic analysis of the cold-end connection tube influence in U-shape pulse tube cooler**

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The objective of this paper was to demonstrate and analyze the influence of cold-end connection tube in U-shape pulse tube cooler (UPTC). A UPTC was constructed and experimented and the performance was undesirable. According to the experimental results, the temperature difference between the cold-end heat exchangers of the pulse tube and regenerator always existed. This phenomenon was explained by the gas parcel thermodynamic analysis. Through thermodynamic analysis about UPTC and linear pulse tube cooler (LPTC), the influence of the cold-end connection tube was verified. According to the research, the periodical movement of the gas parcel in connection tube experienced a thermodynamic process like pumping heat from pulse tube to regenerator. This kind of heat-pumping process leads to the loss of cooling power of UPTC. The further research showed the quantity of the loss was influenced by the size of connection tube, frequency, the phase angle between mass flow rate and dynamic pressure.

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