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C1Po2A-04: The Simulation and Experiments of A High Frequency Single Stage Pulse Tube Cryocooler with Two Cooled Sinks

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In the application of infrared detectors, pulse tube cryocoolers are required to provide cooling power at different temperature ranges simultaneously with light weight and compact construction. Generally, each pulse tube cryocooler can provide cooling power in a certain temperature range with only one cooled sink that is the cold-end heat exchanger. In this paper, a single stage pulse tube cryocooler is designed to provide cooling capacity at different temperature ranges with an extra cooled sink placed in the middle of the regenerator. The axial distribution of volume flow and pressure wave of cryocoolers with middle heat exchanger and without middle heat exchanger are compared theoretically. To verify the simulation results, a series of experiments were also carried out. As a result, the cooling power of cryocoolers with middle exchanger was decreased at 80K, and 0.5W @ 88.5K & 0.5W @ 195.8K cooling capacity was obtained simultaneously at 45W input power.

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