
SESSION 9: Reverse Brayton & JT Coolers

Paper 9.2 Wednesday POSTER Session 1:15 to 2:45 PM

Design and Analysis of a Space 0.3W at 4.5K Hybrid J-T Cooler

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The application of some infrared detectors in space requires a space cryocooler to provide a cooling capacity of over 100 milliwatts at liquid helium temperatures. The hybrid J-T cooler is taking the place of a super-flow helium cryostat due to its advantages of small size and weight and long life. A 0.3W at 4.5K hybrid J-T cooler is designed by our laboratory. The J-T cycle is precooled by a two-stage high-frequency pulse tube cooler, which is able to provide cooling power at 80K and 20K. The influence of charge pressure, precooling temperature and efficiency of the counter-flow heat exchangers on the performance of the hybrid J-T cooler is discussed in detail. Additionally, the main challenges in developing the 0.3W at 4.5K J-T cooler are presented in this paper.