Optimization of the Transition Regenerator for Two-Stage Thermal-Coupled Stirling-Type Pulse Tube Cryocooler

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For the purpose of transferring the PV power from the compressor to the regenerator hot-end of the low-temperature cryocooler, and preventing excessive energy dissipation at the same time, a section of regenerator without pulse tube called transition regenerator is added between the compressor outlet and the regenerator hot-end of the low-temperature cryocooler. The transition regenerator can establish a certain temperature gradient for the gas to play a thermal buffer function. At present, the transition regenerator as an important component causing PV power loss of the two-stage thermal-coupled Stirling-type pulse tube cryocooler, but there are few related researches on it. This article optimizes the experiment from the length, diameter and filling method of the stainless steel wire mesh. The results show that the cooling capacity at 20K is increased by 18.6%, meanwhile, a cooling capacity of 168.6mW@20K and a relative Carnot efficiency based on acoustic power input of 5.2% can be reached.