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# NUMERICAL ANALYSIS OF MINIATURE COAXIAL STIRLING TYPE PULSE TUBE CRYOCOOLER WITH A MODIFIED RESERVOIR


Content :

A two-dimensional CFD model of a modified coaxial Stirling-type pulse tube cryocooler with a design target of less than 4W at 80 K is done, and systematic simulations of the performance characteristics at different temperatures were conducted. The modified Inertance Pulse Tube Cryocooler is driven by a helium compressor shaped single-stage IPTCs to become a linear compressor of Stirling-type. The Inertance Pulse Tube Cryocooler (IPTC) with a modified reservoir is suggested, where the reverse fluctuation of pressure in the compressor case is used instead of the steady pressure in the reservoir to shift the phase of the flow velocity at the hot end of the pulse tube. Therefore, the large reservoir of the cryocooler could be eliminated, and hence the cryocooler simplified and reduced in size. The thermal equilibrium and non-equilibrium mechanisms for the porous matrix are considered and validated. The performance of this type of cryocooler was investigated numerically and compared with an inertance pulse tube cryocooler. The numerical results show that the modified IPTC can work as efficient as an IPTC with a considerable reduction in a size of the reservoir.



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