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Advances on a free piston Stirling cryocooler with a large cooling capacity at 80 K

With the advantages of high thermal efficiency, high reliability and compact structure, a free piston Stirling cryocooler with a large cooling capacity at 80 K is very attractive for applications such as natural gas recondensation and power applications of superconductivity. This article introduces our recent progress on a free piston Stirling cryocooler which was designed based on thermoacoustic theory. To acquire a better understanding and optimize the system, the influence of the regenerator porosity, the cold head heat exchanger dimensions and the operating frequency were investigated in detail. In addition, pressure drop across the regenerator and heat exchangers was observed and its effect was analyzed. Compared with the results reported before, the performance has been improved.

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