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C1Po2D-03 [09]: Numerical Study on Non-equal Section Regenerator Performance for Pulse Tube Cryocooler

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It has always been a research hotspot to improve the overall efficiency of pulse tube cryocooler and the regenerator as the core component of the pulse tube cryocooler directly determines the performance of the overall machine. Therefore, an approach of improving the efficiency of the whole machine has been provided as improving the performance of the regenerator. This paper is based on a 5W@80K pulse tube cryocooler model and the reasons for the influence of the three regenerator structures on the overall efficiency are analyzed and discussed by Sage software. The simulation results show that the optimal overall efficiency of pulse tube cryocooler under three different structural regenerators varies with the compressor electric power input. Simultaneously, the overall efficiency of the non-equal section structure and the conical section structure regenerators are respectively increased by 14.16% and 17.78% compared with the equal section structure.

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