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C1Po1B-08: Theoretical and experimental investigation of the effect of the phase shifter on the compressor of pulse tube cryocoolers

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Phase shifters (inertance tubes and reservoirs) can perform the function of maintaining a proper phase relationship between pressure and mass flow rate. Although many theoretical models of phase shifters have been proposed in previous studies, it is not clear how the parameters of the phase shifters affect the compressor characteristics of pulse tube cryocoolers. How the inertance tubes and the gas reservoir volume affect the compressor displacement and the output PV power are yet to be further investigated. In this paper, the theoretical analysis of inertance tube and gas reservoir volume on compressor displacement and output PV power characteristics is presented, and a miniature pulse tube cryocooler is numerically simulated by building a Sage model. The theoretical and simulation results were experimentally verified by adjusting different combinations of inertance tubes and gas reservoirs.

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