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TRANSIENT ANALYSIS OF SINGLE STAGE GM TYPE DOUBLE INLET PULSE TUBE CRYOCOOLER

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Transient analysis of single stage GM type double inlet pulse tube cryocooler is carried out using a one dimensional numerical model based on real gas properties of helium. The model solves continuity, momentum and energy equation for gas and solid to analyse the physical process occurring inside of the pulse tube cryocooler. Finite volume method is applied to discretize the governing equations with realistic initial and boundary conditions. Input data required for solving the model are the design data and operating parameters viz. pressure waveform from the compressor, regenerator matrix data, and system geometry including pulse tube, regenerator size and operating frequency for pulse tube cryocooler. The model investigates the effect of orifice opening, double inlet opening, and pressure ratio, system geometry on no load temperature and refrigeration power at various temperatures for different charging pressure. The results are compared with experimental data and reasonable agreement is observed. The model can further be extended for designing two stage pulse tube cryocooler.

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