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Novel Numerical Model for Pulse Tube and String Cooler

A novel one-dimension theoretical model of oscillating flow in pulse tube cryocooler and String cryocoooler is established. The model is constructed in Lagrange perspective instead of Euler approach. Limited gas amount in the closed system of the cryocooler supplies feasibility for the model.
The model is helpful to explain the mechanism of regenerative cryocooler, even inertance tubes in pulse tube cryocooler. Gas in the cryocooler is divided into finite small elements, and by using this model to calculate the physics of the elements in the regenerative cryocooler, processes of gas flow and heat transfer between gas and solid can be present more exactly. Besides, thermodynamic cycle of each gas element can be achieved. Based on the thermodynamic cycles, loss of each gas element in the cooler can be found out easily and it is helpful to improve performance of cryocooler.
Cooling process, cold end temperature and many other parameters of the regenerative cryocooler can be predicted by this model

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