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Numerical investigations on the pressure drop characteristics along a compact regenerator

Content :

The regenerator is the most important component in pulse tube refrigerator. Its function is to absorb heat from the incoming gas during the forward stroke of the compressor, and deliver that heat back to the gas during the return stroke. Ideally, regenerator with no pressure drop and a heat exchanger effectiveness of unity are desirable. In this study we are investigating the pressure drop characteristics through a compact regenerator. We have considered a regenerator with cylindrical channels and a porosity of 0.62. The working fluid used is helium gas. The regenerator material used is steel. The analysis is done in ANSYS FLUENT14 software by providing suitable boundary conditions, both steady and unsteady flows are simulated through the regenerator channels at constant Reynolds number and their pressure drop characteristics are compared. The effect of the change in the compressor frequency from 40Hz to 80Hz on the pressure drop along the regenerator is investigated.

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