

عنوان مقاله:

Investigation of the effects of hot tube geometry on the efficiency of vortex tube refrigerators base on FVM analysis

محل انتشار:

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خلاصه مقاله:

In this article, a Ranque–Hilsch Vortex Tube has been optimized utilizing divergence and convergence axial angles for hot tube. Effect of divergence and convergence angles on the flow behavior has been investigated by computational fluid dynamics (CFD) techniques. By using a RNG k- ϵ turbulence model based on finite volume method, all the computations have been carried out. The dimensions of the studied vortex tubes have been kept the same for all models and the performance of machine was studied under five different divergence angles (α), namely 1, 2, 3, 4 and 6 degree, two different convergence angles named 1 and 2 degree adjusted to the hot tube. Achieving a minimum cold exit temperature is the main goal of this numerical research. The results show that utilizing the divergent kind of hot tube improves the cooling capacity of device for most values of inlet mass flow rates. Finally, some results of the CFD models have been validated by the available experimental and numerical data and which show reasonable agreement, and other ones are compared qualitatively.

کلمات کلیدی:

Ranque – Hilsch vortex tube; Divergent vortex tube; Convergent vortex tube; refrigeration; CFD

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