

## عنوان مقاله:

Numerical study of the effect of divergent hot tube on the energy separation in a vortex tube

## محل انتشار:

همایش ملی مهندسی مکانیک (سال: 1391)

تعداد صفحات اصل مقاله: 9

## نویسندگان:

Masoud Rahimi - M.Sc. Student, Department of Mechanical Engineering, Urmia University of Technology, Urmia

Nader Pourmahmoud - Associate Professor, Department of Mechanical Engineering, Urmia University, Urmia

Seyyed Ehsan Rafiee - M.Sc. Student, Department of Mechanical Engineering, Urmia University of Technology, Urmia

Amir Hassanzadeh - Ph.D. Student, Department of Mechanical Engineering, Urmia University, Urmia

## خلاصه مقاله:

Vortex tube refrigerator is a mechanical device with no moving parts that is capable of generating cold and hot gas flows from compressed gas. A source of pressurized gas enters the vortex tube tangentially through one or more inlet nozzle intakes with high speed. The gas stream inside the vortex tube develops a strong swirling flow and separates into a cold and hot stream. Experimental studies show that using divergent hot tube improves the cooling performance of vortex tube. The purpose of this paper is to investigate the effect of using a divergent hot tube on vortex tube refrigeration capacity. The computational fluid dynamics (CFD) model used here is a three-dimensional steady compressible model that utilizes the k- $\epsilon$  turbulence model. In this numerical research, different divergence angles of the hot tube ( $\beta=0^\circ, 1^\circ, 2^\circ, 3^\circ, 4^\circ, \text{ and } 6^\circ$ ) have been simulated in order to analyze the performance of the vortex tube. The results showed that as the angle diverges from the cylindrical model ( $\beta=0^\circ$ ), the cold temperature separation improves at cold mass fractions greater than about 0.4, but increasing the angle to more than  $4^\circ$  impairs the cold temperature separation compared with the cylindrical model because of the development of a secondary circulation in the vortex tube. Validation of a previous experimental study that used a cylindrical vortex tube has also been carried out in this research.

## کلمات کلیدی:

Vortex tube; Divergent hot tube; Numerical simulation; Energy separation

## لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/203578>

