

Viritphon Lueangsangjai 2014: A Study of the Effect of Conical Valve Angle on the Temperature Separation in Vortex Tube by Computational Fluid Dynamics. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Assistant Professor Apichart Chaengbamrung, Ph.D. 71 pages.

Vortex tube is a device used for spot cooling of tools in manufacturing industry. Pressurized air is injected tangentially with high rotational speed into a swirl chamber, resulting of separated temperature of flow. Temperature of air flow near inside surface of tube is higher than temperature of air flow at the center of tube. Hot air that flow near inside surface of tube will flow pass conical valve to hot end of vortex tube. In the other hand, cold air that flow in the center of tube will flow hitting conical valve and go back to cold end of vortex tube.

The previous research of the temperature separation in the vortex tube is to develop a higher efficiency of vortex tube but lacking of study of detailed parameters, especially in view of conical valve angle. This research presents a simulation of the effect of conical valve angle on the temperature separation in vortex tube. Computational Fluid Dynamics (CFD) method was used to simulate air flow in vortex tube to study the effect of conical valve angle on temperature separation. The result is found that angle of conical valve effects the separation of air temperature. Small valve angle will create more effective of temperature separation than the larger one.

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