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Experimental Investigation of Thermal Performance of Parallel Connected Vortex Tubes with Various Nozzle Materials

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ABSTRACT

This paper is about experimental investigation for thermal performance of two identical parallel connected counter flow Ranque-Hilsch vortex tubes by using different orifice nozzle numbers and nozzle materials and also compressed air as a working fluid. The effects of nozzle numbers and materials on thermal performance by applying compressed air at the inlet at different pressures were experimentally determined. Experimental analyses were carried out by using polyamide plastic, aluminum and brass as nozzle materials with inlet pressure range 150 kPa – 550 kPa with 50 kPa increment. Orifices having 2, 4 and 6 nozzle numbers were used in the vortex tubes. The length – diameter ratios (L/D) of the vortex tubes are 14 and the cold mass fractions are 0.36. The results of experimental studies revealed that the maximum performance was obtained with aluminum nozzles with nozzle number 6 at 550 kPa inlet pressure.

Keywords: Ranque–Hilsch vortex tube, Vortex tube performance, Cooling, Heating

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