

Experimental Investigation of Counter-Flow Ranque-Hilsch Vortex Tube Using Humid Air

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Abstract : An experimental investigation is carried out on counter-flow Ranque-Hilsch vortex tube (RHVT). The present work is carried out to study the effect of nozzle aspect ratio, tube length and the inlet pressure (P_i) on the coefficient of performance and energy separation of a RHVT. Further, the effect of moist air with different relative humidity (RH) 40, 60, 80 % is also achieved. The air relative humidity is adjusted using air humidification/dehumidification unit. The experimental study accomplished for number of nozzle $N=6$, with inner diameter $D=7.5$ mm., and length of the vortex tube (L) 75, 97.5, and 112.5 mm. The results show that the relative humidity has a significant effect on coefficient of performance and energy separation of a RHVT.

Keywords : COP, counter-flow Ranque-Hilsch vortex tube, energy separation, humid air

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