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The effect of vortex generator materials and L/D ratios on performance of stainless vortex tube

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The present study was carried out an experimental investigation on the effect of vortex generator materials and length to diameter ratios (L/D) on the performance of a vortex tube. The vortex tube was made from stainless. The vortex generator materials are stainless and brass. The ratio of length to diameter of the vortex tube was studied at 17.5 and 20. This experiment tested at inlet air pressure 1.5 bar and the cold mass fraction vary from 0.4 to 1. The results showed that the cold air temperature difference, hot air temperature difference and isentropic efficiency of the stainless vortex tube with stainless vortex generator were higher than the stainless vortex tube with brass vortex generator at 22%, 5% and 13.5% respectively. In term of L/D ratio, the result shows that the cold air temperature difference of the vortex tube with the ratio of 17.5 was higher than the vortex tube with the ratio of 20 at 4%. Both are close in the value of a hot air temperature difference and isentropic efficiency. It is also found that the stainless vortex generator and the L/D ratio of 17.5 have the highest performance achievement.

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