

CFD ANALYSIS ON VORTEX TUBE

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ABSTRACT

Present work has focused on the energy separation and flow field behavior of a vortex tube by utilizing both straight and helical nozzles. Three kinds of nozzles set include of 3 and 6 straight and 3 helical nozzles have been investigated and their principal effects as cold temperature difference was compared. The studied vortex tubes dimensions are kept the same for all models. The numerical values of hot and cold outlet temperature differences indicate the considerable operating role of helical nozzles, even a few numbers of that in comparing with straight nozzles. The results showed that this type of nozzles causes to form higher swirl velocity in the vortex chamber than the straight one. To be presented numerical results in this paper are validated by both available experimental data and flow characteristics such as stagnation point situation and the location of maximum wall temperature as two important facts. These comparisons showed reasonable agreement.