

Energy Separation Mechanism in Uni-Flow Vortex Tube Using Compressible Vortex Flow

Authors : Hiroshi Katanoda, Mohd Hazwan bin Yusof

Abstract : A theoretical investigation from the viewpoint of gas-dynamics and thermodynamics was carried out, in order to clarify the energy separation mechanism in a viscous compressible vortex, as a primary flow element in a uni-flow vortex tube. The mathematical solutions of tangential velocity, density and temperature in a viscous compressible vortical flow were used in this study. It is clear that a total temperature in the vortex core falls well below that distant from the vortex core in the radial direction, causing a region with higher total temperature, compared to the distant region, peripheral to the vortex core.

Keywords : energy separation mechanism, theoretical analysis, vortex tube, vortical flow

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