Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Thrust and Flow Field Characteristics of Asymmetric Turbulent Pulsed Jets CESAR LEOS[1], Member, ROBERT FREEMAN[2], None, ISAAC CHOUTAPALLI[3], Member — An experimental study was conducted to study the effect of nozzle exit Mach number and the nozzle exit geometry on the characteristics of a free pulsed jet and pulsed jet ejector. Four converging nozzles of various exit geometry (circular, diamond, elliptic, and rectangular) were utilized to perform the study. The diameter of the axisymmetric circular nozzle is 50.8 mm and the asymmetric nozzles had the same exit area as that of the circular nozzle with aspect ratio 2:1. Both the thrust and flow field measurements were conducted for nozzle exit Mach numbers 0.10, 0.20 and 0.30 over a range of pulsing frequencies from 24Hz to 180Hz. The force measurements showed that, for a given nozzle geometry, the free pulsed jet and pulsed ejector thrust augmentor exhibited a weak dependence on the nozzle exit Mach number and a strong dependence on the pulsing frequency. Furthermore, strong evidence of thrust augmentation dependence on nozzle geometry, exit Mach number, and pulsing frequency was observed for the nozzle cohort. Flow field measurements using PIV showed that the phase-averaged and global flow characteristics of the free pulsed jet and pulsed ejector are dependent on pulsing frequency and nozzle exit geometry, with a weak dependence on the nozzle exit Mach number.

[1]Graduate Research Assistant, Member APS
[2]Professor
[3]Associate Professor, Member APS

Cesar Leos
Member

Date submitted: 31 Jul 2019 Electronic form version 1.4