Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Turbulence Modulation of a Weakly Compressible Wall-Jet CRISTALE GARNICA, BERTRAND ROLLIN, Embry-Riddle Aeronautical University — Wall-jets are flows of paramount importance in modern engineering, where applications in thermal protection, combustion, flow control and noise generation are numerous. It can be seen as being composed of two canonical flows: a boundary layer and a free mixing flow. In this paper, the focus is turned to the modulation of turbulence in weakly compressible isothermal wall-jets, when subject to changes in the jet-inlet conditions. Direct Numerical Simulations (DNS) of wall-jets are carried out using PyFR [1], a Python based computational fluid dynamics framework. Analysis of mean profiles and turbulence quantities response to carefully designed excitation profiles will be presented, as well as changes in coherent structures of the turbulent flow. Finally, of particular interest is the relation between the Kelvin-Helmholtz instability and the modulation of turbulence in both the outer and the inner-layer.

[1]Witherden, F. D., et al., PyFR: *An open source framework for solving advection-diffusion type problems on streaming architectures using the flux reconstruction approach.* Computer Physics Communications, 185(11), 3028-3040, 2014.

Cristale Garnica
Embry-Riddle Aeronautical University

Date submitted: 01 Aug 2017 Electronic form version 1.4