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Wall-Jet Turbulence and Mixing Control by Way of a Pulsed Inlet Velocity CRISTALE GARNICA, BERTRAND ROLLIN, Embry-Riddle Aeronautical University — Attaining skin friction reduction and increasing flow mixing is of utmost importance to enable breakthroughs in fuel efficiency, heat transfer, as well as drag and noise reduction. The turbulent plane wall-jet constitutes a typical flow configuration where turbulence phenomena associated to these engineering applications occur. Direct Numerical Simulations (DNS) are performed to investigate how skin friction and flow mixing are affected by introducing controlled perturbations, jet inlet pulsing, at the shear layer origin. The jet inlet pulse frequencies are varied in time and space to investigate its influence in the downstream domain. The forcing affects the energy of the large-scales which will consequently affect the small-scales allowing turbulence modulation. The interaction between inner and outer layer are of particular interest to understand the effects near the wall. Comparisons of experimental and computational data from previous studies, with and without external perturbation or co-flow, are used to quantify the effect of jet inlet pulsing on wall-jet characteristics, which include eddy production, velocity profiles, maximum velocity decay, half-width jet growth, and coherent structures.

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