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The effect of excitation on the plane wall jet[1] SHIBANI BHATT, SRAVAN ARTHAM, EBENEZER GNANAMANICKAM, Embry-Riddle Aeronautical University — The plane wall jet (PWJ) is a unique boundary layer flow in which the highly energetic large-scales of the outer free shear layer transition to turbulence through an inviscid process while, the wall-bounded layer becomes turbulent through a viscous mechanism. These large-scale structures of the PWJ amplitude and frequency modulate the finer scales of the flow much like in canonical boundary layers. However, the unique configuration of the PWJ allows for the independent excitation of the large-scales in the flow to study this interaction with the finer scales. An experimental study is carried out in a PWJ facility operating at friction Reynolds numbers $Re_\tau > 1000$. The PWJ is excited over three decades of Strouhal number. The changes to the turbulent statistics due to the excitation, across the boundary layer, are presented. It was seen that the excitation alters the energy spectra across the entire boundary layer. Certain scales were excited and others augmented and this modification was a function of the excitation frequency. In general, the energy of the large-scales were more significantly altered when compared to the finer scales. Certain excitation frequencies appear to more dramatically alter the energy of the large-scales with changes also to the wall shear stress.

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