

Abstract Submitted
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Nonlinear wavepackets in unstable boundary layers: experiments and modeling¹ MARCELLO MEDEIROS, University of Sao Paulo — The work involved wind tunnel experiments and weakly nonlinear modeling of modulated TS waves. It covered from wavetrains emanating from a harmonic point source to the wavepackets from pulses. The nonlinear regime of these waves exhibit three stages. The first one was governed by direct nonlinear forcing and produced longitudinal streaks. The second was governed by K- type instability. Both stages were triggered by the spanwise modulation. The third nonlinear stage was governed by subharmonic, H - type instability and was exclusive of streamwise modulated waves. The phase of the waves relative to the modulation envelope was also found to be very important for the third stage only. In general, it was found that the modulation did not affect the kernel of the secondary instabilities observed. The effect of both streamwise and spanwise modulation was on the deterministic production of seeds for these instabilities, via quadratic interaction of the existing modes. The weakly nonlinear model explained many features that at first seemed surprising. For instance, the effect of phase on the subharmonic stage was explained by the production of subharmonic seeds from the direct nonlinear interaction of both the primary modes and the fundamental instability modes.

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