Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Development of a Three-Dimensional Code for a Direct Numerical Simulation of Compressible Flow Instabilities RICARDO ALBERTO COPPOLA GERMANOS, MARCELLO AUGUSTO FARACO DE MEDEIROS, Usp - Universidade de Sao Paulo — The engineering research and design requirements of today pose great challenges in computer simulation to engineers and scientists who are called on to analise phenomena in continuum mechanics. In the current work, the instability of the compressible boundary layer at relatively low Reynolds number was investigated. In the aerospace context, important applications involve compressible flows at relatively low Reynolds number. Among them, the flow on gas turbine blades and the flow on high lift devices such as slats and flaps at high angle of attack are particulary important. In aerodynamic applications in low Reynolds number, often a substancial portion of the flow is in the a transition regime, or in the initial stages of a turbulent flow. Recent work in boundary layers has shown in the nonlinear regime, modulated waves behave diferently from regular wavetrains. This is particularly important in view that the waves that arise in natural transition are also strongly modulated. It was also shown that wavepackets and wavetrains emanating from a point source provide a good model for instability natural transition. Inspired on the worked devoted to modulated waves in boundary layers, the current work investigates the evolution of wavepackets and wavetrains from a point source in a boundary layer.

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Date submitted: 01 Aug 2006 Electronic form version 1.4