Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Spanwise modulations in shock-induced boundary layer separations[1] LIONEL LARCHEVEQUE, LIONEL AGOSTINI, JEAN-PAUL DUSSAUGE, IUSTI, UMR CNRS 6595, Provence University, Marseille, France, SUPERSONIC GROUP TEAM — Large-eddy simulations are carried out in order to clarify the origin of the large-scale spanwise modulations found experimentally within the separation bubble induced by a shock impinging on a turbulent boundary layer. Structures of various spanwise lengthscales are highlighted by means of short time averaged flowfield and spatial Fourier transforms. The individual influences of each of these modulations on the global dynamics of the flow are investigated by varying the spanwise extent of the computational domain. The effects of the spanwise boundary condition, ranging from periodicity to no-slip, are also investigated. Joint time-space spectral analyses are performed to quantify the timescale associated with each of the spanwise lengthscales. These timescales are compared with the timescales of the phenomena found in two-dimensional shock-boundary layer interaction with separation such as the shock motion, the mixing layer developing over the separated bubble and the turbulent structures stemming from the incoming boundary layer. The results are used to draw some conclusions on the possible origins of the spanwise modulations.

[1]Work partly supported by the CNES-ONERA ATAC programme.

Jean-Paul Dussauge
IUSTI, UMR CNRS 6595, Provence University, Marseille, France

Date submitted: 08 Aug 2009 Electronic form version 1.4