Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Shock motion and flow separation. JEAN-PAUL DUSSAUGE, SEBASTIEN PIPONNIAU, PIERRE DUPONT, JEAN-FRANCOIS DEBIEVE, IUSTI/CNRS/Univ.Aix-Marseille, SUPERSONIC TEAM — In separated shock/boundary layer interactions, the system of shock wave is unsteady. The frequencies of the shock oscillations are, in first analysis, much lower than in the rest of the flow, including the separated zone. This result is discussed in different cases. A compilation of the dominant frequency of the shock motion is recalled, where frequencies are normalized by the upstream velocity and by the length of interaction. This puts the results together with some scatter, but determines more than the right order of magnitude of the dominant frequency. Two particular flow cases are examined: compression ramp flows and shock reflections. It has been proposed (Ganapathisubramani et al. 2006) to explain the low frequencies in compression ramp flows as the action of very large scale eddies (VLSE), on the basis of a strong correlation between VLSE and shock corrugations. However, in shock reflections, such events cannot explain the measured low frequencies. In this case, the explanation is probably in the 3-d structure of the separated bubble or in the onset of global instability in the separated zone. Finally it is shown that VSLE can produce the right frequency range in the compression ramp flow, and therefore that there is no contradiction between the two cases.

Jean-Paul Dussauge
IUSTI/CNRS/Univ.Aix-Marseille

Date submitted: 26 Jul 2007 Electronic form version 1.4