

# ON THE MUTUAL PENETRATIONS OF TWO GASES SUBMITTED TO THE RICHTMYER-MESHKOV INSTABILITY: NUMERICAL STUDY

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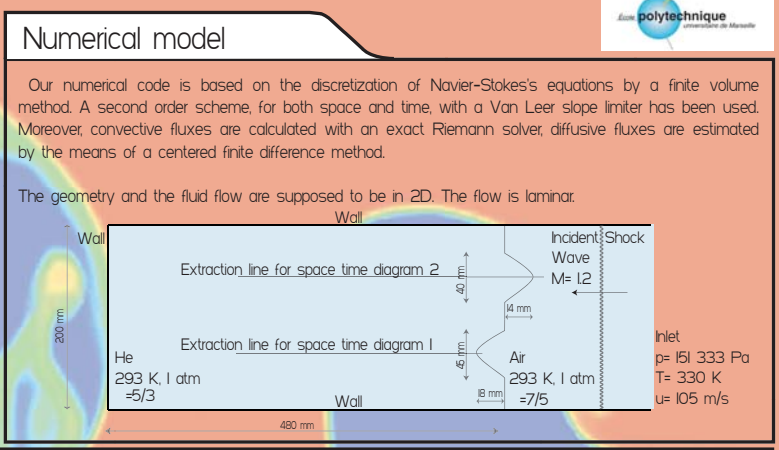
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### Introduction

A laser sheet experimental diagnostic technique has been developed in our laboratory to study the mutual penetration of two gases submitted to the Richtmyer-Meshkov instability.

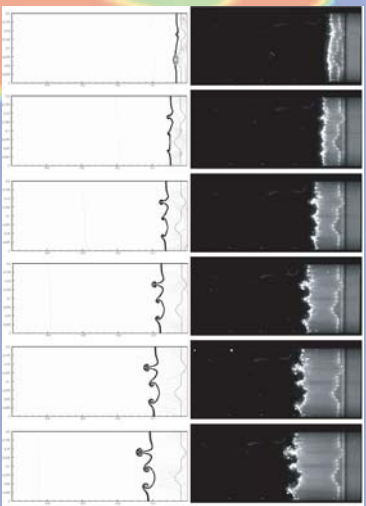
Due to the difficulties encountered in the interpretation of experimental frames, an on site numerical support appears to be very welcomed. Indeed, the thin nitrocellulose membrane, which initially separates the two gases, disturbs the laser sheet diffusion and creates sur-exposed zones on the film. Thus, the exact localization of the interface is impossible. By the mean of our code, CARBUR, we are able to simulate these experiments and gives the evolution of the two gases, as well as the access of physical variables, as vorticity, specie concentrations and baroclinic terms.



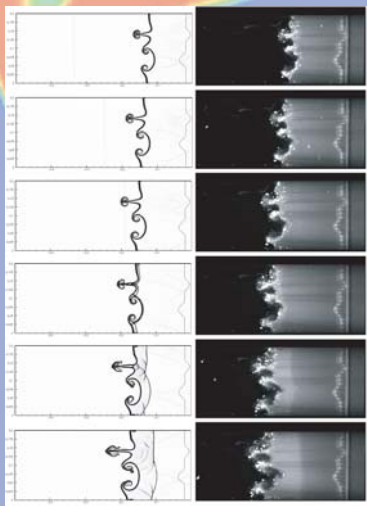
### Results & Discussion

In the present work, we have studied the evolution of an heavy/light interface (air/He) submitted to a shock wave acceleration. The simulation correctly describes the distortion mechanisms, even in non-linear regime.

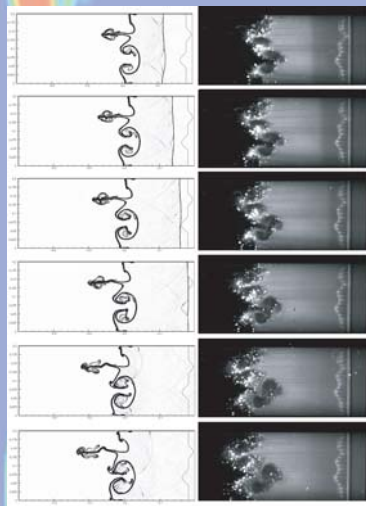
Air/Helium interface  $t = 100 \mu s$



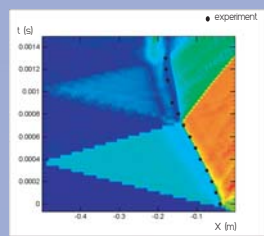
Numerical schlieren Laser Sheet



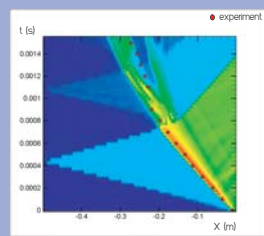
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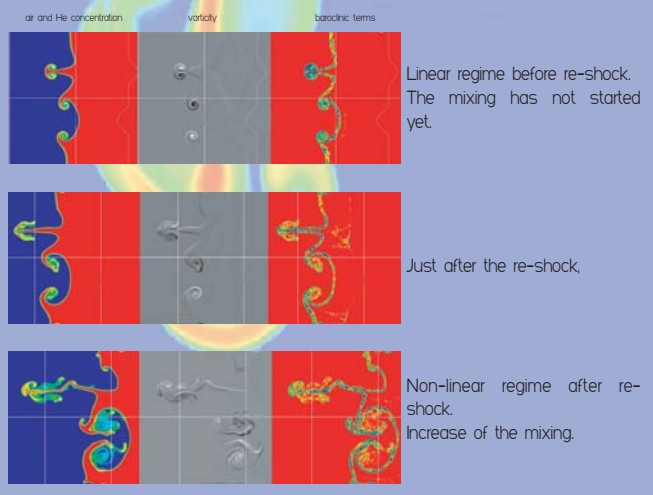
Numerical schlieren Laser Sheet



Space-time diagram 1 of the fluid flow Mach number and experimental points



Space-time diagram 2 of the fluid flow Mach number and experimental points



### Conclusion

Numerical results are in good agreement with experiments.

The distortion mechanisms and the shock wave reflections are well simulated.

The evolution of the bubble and the spike interface is well described before re-shock, compared to experimental position.

For later times, a turbulence model will be added.