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# Numerical LES models of Richtmeyer-Meschkov and Rayleigh-Taylor instabilities

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The relation between fractal analysis and spectral analysis can be very useful to determine the evolution of scales. Presently the emerging picture of the mixing process is as follows. Initially a pure RT instability with lengthscale appears, together with the disturbances caused from the initial set-up (Youngs 1989). The growth and merging of disturbances favors the appearance of several distinct blobs, bubbles or protuberances which produce shear instabilities on their sides. These sometimes develop further secondary accelerated and sheared instabilities. After 2/3 of the tank three dimensional effects have broadened the spectrum of lengthscales widely enough as to have a fractal structure in the visual range with dimensions ranging between 2.15 and 2.40. Some differences may be detected in the maximum fractal dimension evolution in time for experiments with different Schmidt or Prandtl numbers as described in Redondo (1996). The use of a Pseudo Keulegan number allows to relate the mixing ability of a front to both the molecular properties and to the initial range of velocities and scales able to develop. The difference between RT and RM fronts is analyzed in terms of spectral distribution of the scalar and vector fields (volume fraction, velocity and vorticity).

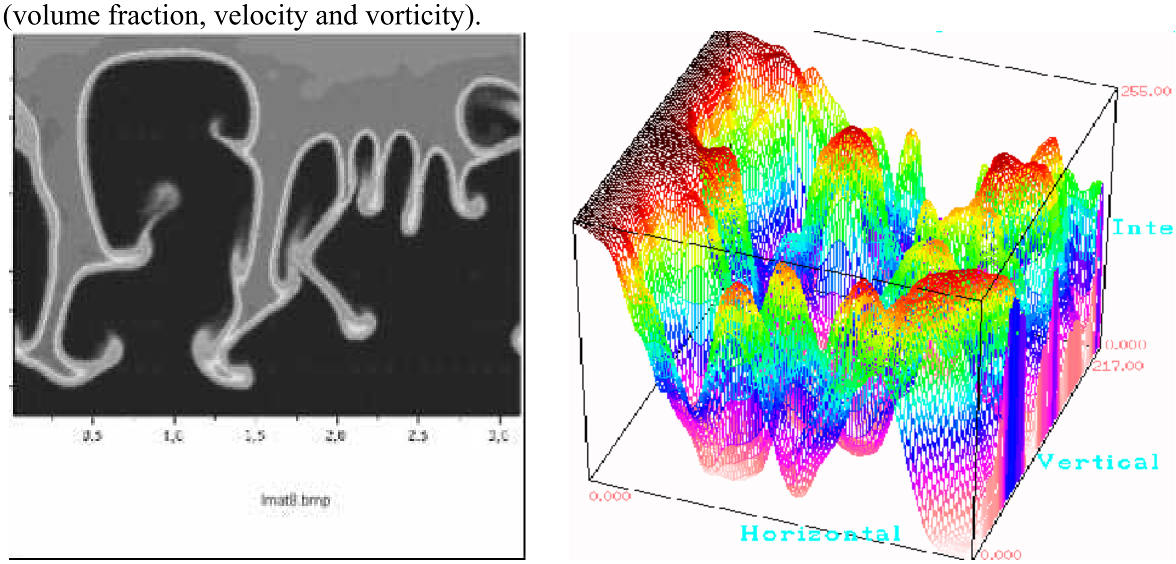


Figure 1. Structure of the RM and RT fronts.

Information about the mixing can be extracted from the thickening of the edges examined with Laplacian filters in both the RT and RM simulations, The use of higher moments of the density and velocity differences shows the differences between the more and less active mixing regions, (Linden and Redondo 2002). The RM fronts generally exhibit lower fractal dimensions than comparable RT fronts.

## References

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