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Mixing in Richtmyer Meshkov and Rayleigh Taylor fronts

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Experimental and numerical results on the advance of a mixing or nonmixing front occurring at a density interface due to gravitational acceleration are analyzed considering the spectral structure of the front. The experimental configurations presented consists on an unstable two layer system held by a removable plate in a box for Rayleigh-Taylor instability driven fronts and a dropping box on rails
and shock tube high Mach number impulse across a density interface air/SF6 in the case of Richtmyer-Meshkov instability driven fronts.

A combination of experiments and numerical simulations have been compared. The experiments in shock tubes were performed with accelerations up to 1.5×104g (g is the acceleration of gravity) and Atwood numbers A=(a-b)/(a+b), where a and b are
the densities of the used gases or liquids across the interface) of the initial mixing layer from -0.64 up to +1.17. The experiments have been used to establish a model describing the instability, and to validate both this model and one-, two- and three dimensional
numerical simulations of the flow. The results of detailed distribution of energy cascades that may be often related to pmtermittency measurements are expected also be used to predict the behaviour of instabilities triggered in the compression of layered ICF targets and most importantly, to be able to control mixing from a previously arranged set of initial conditions.
The modification of turbulent mixing model for the description of ICF targets, are obtained from the scale to scale analysis of the
flows, including concentration and density in a highly heterogeneous flow, these complex flows do not have at present a full valid theory.

A very important practical application are the ignition conditions for ICF, but it is precisely the high mixing triggered by RT and RM instabilities in the Deuterium, Tritium and holding interfaces that lower the gain, thus the absolute need to understand and control mixing structure.