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# Time evolution of the fractal dimension of a mixing front

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We present a description of an experimental study of an array of turbulent plumes (from one to nine plumes), investigating the time evolution of the fractal dimension of the plumes and also the spatial evolution of the fractal dimension from one plume to other. We also investigate the effects of bouyancy (different Atwood numbers), the number of plumes and the height of the bouyancy source on the fractal dimension.
The plumes are formed by injecting a dense fluid from a small source (from one to nine orifices) into a stationary body of lighter brime (saline solution) contained in a tank. The source fluid was dyed with fluorescein and we use the LIF technique. The plumes were fully turbulent and we have both momentum and bouyancy regimes.
The fractal dimensions of contours of concentration were measured. The fractal analysis of the turbulent convective plumes was performed with the box counting algorithm for different intensities of evolving plume images using the special software Ima_Calc.
Fractal dimensions between 1.3 and 1.35 are obtained from box counting methods for free convection and neutral boundary layers. Other results have been published which use the box counting method to analyze images of jet sections –produced from LIF techniques. The regions where most of the mixing takes place are also compared with Reactive flow experiments using phenolphthalein and acid-base interfaces performed by Redondo(1994) IMA 43. Eds M. Farge, JC Hunt and C. Vassilicos.