GLOBAL RAINBOW THERMOMETRY

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The Global Rainbow Thermometry (GRT) is a non-intrusive measurement technique able to measure the size and the temperature of an ensemble of droplets dispersed in a liquid or gaseous bulk

To estimate the level of influence of possible droplet non-sphericity, simulations have been performed, showing that the droplets non-sphericity affects strongly the mean droplet diameter determination.

A new model proposed has been tested with good results. The tests have been made using such a model to simulate the experimental GRT pattern of a water spray and the results obtained are in agreement with the ones achieved with PDA measurements. The tests have been performed using an optimisation procedure based on the least square fit method with a convergence criterion of 10^{-4}. The solution unicity has been proved by investigating the residual's contour pattern.

New experiments in which the temperature and the size of the droplets can also be measured and controlled with other techniques have been performed. Such experiments consist in the measure of the temperature and size of a droplet suspended in a liquid bulk. The droplet formation has been made by means of a syringe whose piston is pushed by a motorized table. The techniques used to measure the droplet size and temperature were respectively the direct observation of the droplet and the measure of the bulk temperature (measurements performed in isothermal conditions). The droplet size and temperature obtained with the Rainbow technique are in agreement with the ones obtained with the other techniques used.

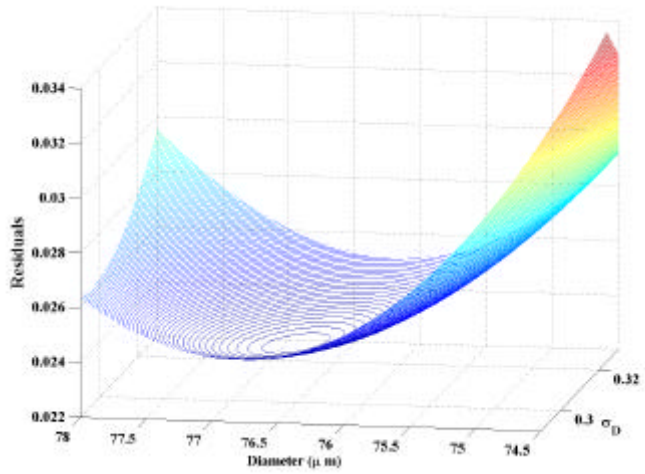

Figure1: Contour residuals

Figure 2: Liquid droplet suspension