DEVELOPMENT OF THREE-DIMENSIONAL TOMOGRAPHY METHOD FOR ANALYSIS OF DROPLET BEHAVIOR

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KEYWORDS:
Main subjects: flow visualization and control
Fluid: water droplet
Visualization method: tomographic particle image velocimetry
Other keywords: tomography, electrohydrodynamic jetting

ABSTRACT: Three-dimensional optical tomography techniques have been developed to reconstruct three-dimensional objects using a set of two-dimensional projection images. A ray-tracing method and a blob method using several basis functions such as a cubic cosine basis function, a cubic B-spline basis function and a Gaussian basis function have been used to calculate the weighting coefficients for the projection matrix. The multiplicative algebraic reconstruction technique (MART) has also been used to solve the inverse problem. The reconstructing program has been examined by using several phantoms including droplet behaviors and random distributions of particles in a volume. The three dimensional volume of particles has been reconstructed from four projections which are positioned with an offset angle of 45° between each others. Then, the three-dimensional velocity fields has been obtained from the reconstructed particle volumes by the three-dimensioanl cross correlation. The velocity field of the synthetic vortex flow has been reconstructed to analyze the three-dimensional tomography algorithm.

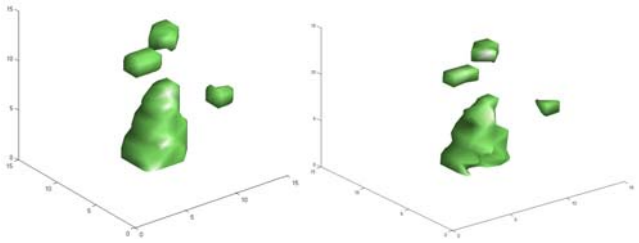

Fig. 1 Synthetic phantom of four droplets (left), reconstruction of phantom using MART (right)

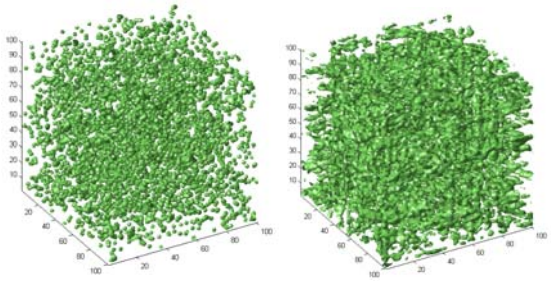

Fig. 2 Synthetic phantom of particle distribution (left), reconstruction of phantom using MART (right)

References

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