Journal of Visualization, Vol. 7, No.4 (2004) 270

Visualization of Particle Dispersion by Vortex Structures with Direct Numerical Simulation*

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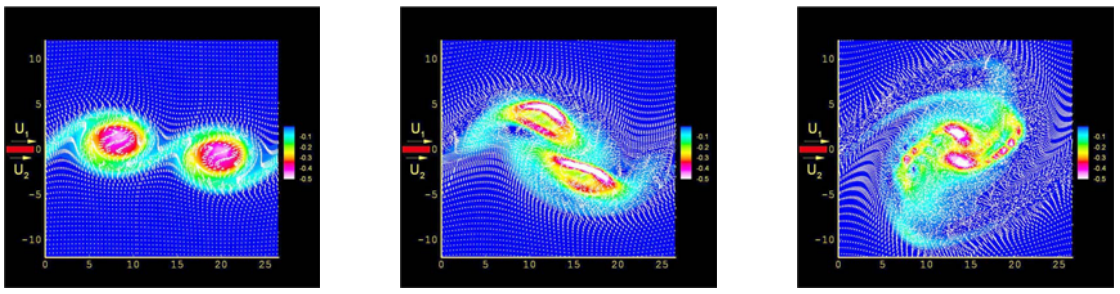
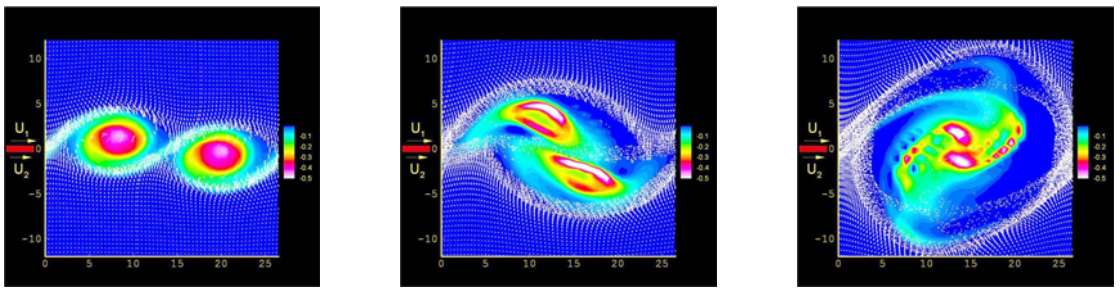


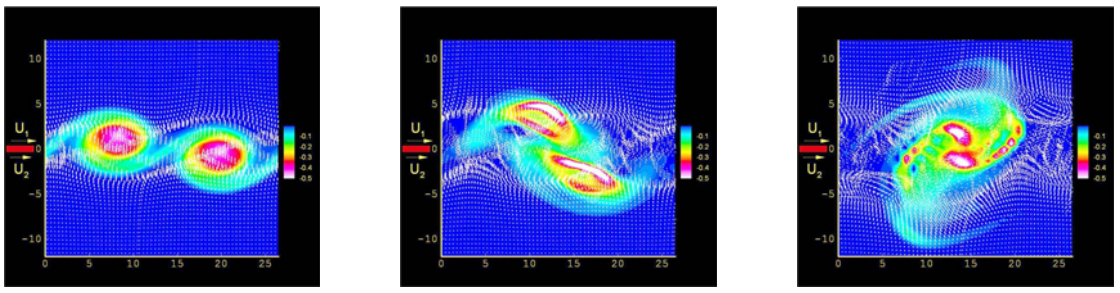
(a) (b) (c)

Fig. 1. The dispersion patterns with time for particles at *St*=0.01.
(a) T=35; (b) T=60; (c) T=85



(a) (b) (c)

Fig. 2. The dispersion patterns with time for particles at *St*=5.
(a) T=35; (b) T=60; (c) T=85



(a) (b) (c)

Fig. 3. The dispersion patterns with time for particles at *St*=100.
(a) T=35; (b) T=60; (c) T=85

The particle dispersion with different Stokes numbers by the vortex structures in a turbulent mixing layer was directly simulated. The white dots in the figures represent the particles distribution, and the color contours represent the vortex structures. For small Stokes number (Fig. 1), the particles followed closely the turbulence of the fluid, however, for large Stokes number (Fig. 3), the fluid motion should have little effect on the particles. For particles with Stokes number of the order of unity (Fig. 2), the particles tendency to concentrate near the outer edges of the larger-scale structures was evident. The visualizations showed that the dispersion of particles was closely related to the large-scale organized structures.

* Supported by Zhejiang Provincial Natural Science Foundation of China under Grant No. M503094, and Scientific Research Fund of Zhejiang Provincial Education Department under Grant No. 20030841.