Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Experimental study on the interaction between Burgers vortex and a solid particle using 2D PIV measurement YOHSUKE TANAKA, TAKUYA TSUJI, TOSHIHIRO KAWAGUCHI, TOSHITSUGU TANAKA, YUTAKA TSUJI, Department of Mechanical Engineering, Osaka University — Many researchers mainly study on the statistical properties of the turbulence and kinematics of particle motion. In the present study, we focus on the elementary step of an interaction between single Burgers vortex tube and a heavy particle. Particular attention will be paid to understanding how heavy particle influences Burgers vortex, and how the vortex is strengthened. Burgers vortex is the simplest model of tube-like coherent structures. Burgers vortex represents one of the few known exact solutions to the full Navier-Stokes equations, and the vortex have two-dimensional vorticity field. This vorticity change is observed by 2D PIV measurement. There are many situations where the particle size dp is the order of Kolmogorov scale or larger, and the particle Reynolds number Rep is larger than unity. The effect of finite particle size, particle wake, and vortex shedding are important in this range. We carried experiments on conditions of $150 < \mathrm{Rep} < 1400$ and $0.5 < \mathrm{dp}/\eta < 1.5$, and we observed the influence of the distance between vortex and particle.

Yohsuke Tanaka

Date submitted: 03 Aug 2006 Electronic form version 1.4