Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Simultaneous 3D measurement of flow velocities and an arbitrarily moving surface[1] YOUNG JIN JEON, HYUNG JIN SUNG, KAIST — Simultaneous 3D measurement technique for flow velocities and an arbitrarily moving surface has been developed by applying image processing methods to the tomographic PIV. Particles and a surface were captured simultaneously through a conventional PIV system without additional cameras or an illumination device. To adjust the optimal exposure times of particles and the surface in the similar time scales, red fluorescent tracer particles were used and long pass glass filters were installed in the lens system. The volume self calibration was employed for improving the 3D reconstruction qualities. Particles and a surface image could be separated by using an image separation. 3D surface shapes were then reconstructed by applying the feature detection and the morphological evaluation to the surface image. Subsequently, particle volumes were reconstructed by MLOS-SMART. The surface reconstruction procedure was validated for various known shaped bodies. Experiments for flows around a rotating cylinder, a flag motion and a flapping flag were carried out to investigate the applicability of the present technique.

[1]This study was supported by the Creative Research Initiatives of NRF/MEST (No. 2011-0000423) of Korea.

Young Jin Jeon
KAIST

Date submitted: 05 Aug 2011 Electronic form version 1.4