Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Simultaneous measurement of pipe flow downstream and upstream of 90 degrees bend by using stereo PIV[1] JUN SAKAKIBARA, NOBUTERU MACHIDA, Department of Engineering Mechanics and Energy, University of Tsukuba — We measured velocity vector distribution in cross sections of a fully developed turbulent pipe flow upstream and downstream of a 90 degrees bend by using stereo PIV and single camera PIV simultaneously. Reynolds number was Re=27,000, and ratio of inner diameter d (=50mm) of the pipe and radius of the centerline of the bend was 1.0. Instantaneous flow field downstream of the bend represented the unsteady motion of the anti-symmetric counter-rotating Dean vortices. Stagnation point, which was created by the flow induced by the two vortices, was observed at both inner and outer side of the bend. The stagnation point moves unsteadily within roughly 30 degree above and below the symmetry plane. In order to clarify the origin of such unsteady motion of the stagnation point, conditional average of the upstream velocity vector field conditioned by the azimuthal location of the stagnation point downstream the bend was computed. Under condition where the inner side stagnation point stays above (below) the symmetry plane, the conditional streamwise velocity upstream the bend exhibited a positive peak below (above) the plane on the outer side.

[1]This study was partially supported by Tokyo Electric Power Company.

Jun Sakakibara
Department of Engineering Mechanics and Energy, University of Tsukuba

Date submitted: 04 Aug 2011 Electronic form version 1.4