

Abstract Submitted
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Stereo-PIV study of turbulent flow downstream of a bend in a round pipe¹ JUN SAKAKIBARA, AKIRA HASHIMOTO, Department of Engineering Mechanics and Energy, University of Tsukuba — We measured three-components of velocity vector distribution in cross sections of a fully developed turbulent pipe flow downstream of a 90-degree bend by means of stereo PIV. Reynolds number was $Re = 120,000$, and ratio of inner diameter d of the pipe and radius of the centerline of the bend was 1.5. Temporal and spatial evolution of turbulent Dean type of vortices has been captured. Proper orthogonal decomposition (POD) was applied to the velocity field in cross-sections. At a streamwise distance $z = 2d$ downstream from the bend, the power spectrum of the time-dependent POD coefficient of the 2nd mode shows a dominant peak at $St = 0.07$. The power of the 1st and 2nd mode structures identified at $z/d = 2$ were switched further downstream, and the structure of 2nd mode at $z/d = 2$ tends to be dominant. Reconstruction of the velocity vector field based on the 1st mode at $z/d = 2$ with mean velocity vectors gives flow pattern similar to that of swirl switching, while the 2nd mode at $z/d = 2$ is responsible to the rotation of the symmetry plane of the twin vortices.

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