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Development of 3D tomographic X-ray PIV technique[1] SUNG YONG JUNG, SANG JOON LEE, Center for Biofluid and Biomimic Research, Department of Mechanical Engineering, POSTECH, Korea — An X-ray tomography particle image velocimetry (PIV) technique employing a medical X-ray tube as a light source was developed to measure three-dimensional velocity field information of various fluid flows. The PIV velocity field measurement technique has been used to extract velocity vectors of tracer particles seeded in a flow by tracing their displacements. The conventional PIV techniques using visible light are inappropriate to measure flows in opaque conduits. To overcome these limitations on special applications, the X-ray PIV technique has been developed. In the X-ray imaging technique, the volumetric information along the pathway of X-ray propagation were compressed on the projected image. Therefore, the X-ray computed tomography has been employed to reconstruct the three-dimensional structure of opaque materials using multiple X-ray images captured at several different angles. As a resent, we could successfully reconstruct a three-dimensional velocity field from two-dimensional image-pair cross-correlation without reconstructing three-dimensional particle images.

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