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Three-component velocity measurement in a micro-scale three-dimensional flow environment using correlation tracking. NEJDET ERKAN, KYOSUKE SHINOHARA, Dept. of Quantum Eng. and Systems Science, University of Tokyo, KOJI OKAMOTO, Dept. of Environmental Studies, University of Tokyo — A tentative study on a technique for measuring the full field (x,y,z,u,v,w) velocity distribution of the fluid flow at the micrometer scale using single high-speed camera, an epifluorescent microscope, a CW laser, and a piezo actuator. To investigate the three-dimensional (3D) flow structures on a microscopic scale flow, 3D scanning micro-particle image velocimetry was applied to the inclined micro round tube. A three-dimensional (3D) scanning micro-PIV technique having a micrometer scale spatial resolution is applied to an inclined micro round tube to develop the 3D-3C velocity measurement technique with a formerly known out of plane velocity component. In two time sequential micro or macro PIV images, if they are correlated and then they are deformed with respect to the half of the in-plane displacements they will become almost the same. In this study, we investigated the alteration of the correlation peak height in the time domain. Gradient of the cross-correlation is strongly related with the dept-wise velocity component. Correlation peak height alteration captured clearly in time sequential image assemblies. From these correlation gradients, extraction of depth-wise velocity component could seem to be straight forward.

Nejdet Erkan
Dept. of Quantum Eng. and Systems Science, University of Tokyo

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