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Three component velocity extraction method using TR-PIV in a microtube NEJDET ERKAN, Department of Quantum Eng. and Systems Science, The University of Tokyo, KOJI OKAMOTO, SATOSHI SOMEYA, Visualization Laboratory, The University of Tokyo — Measurement of three-component (3C) velocity field in the microfluidic devices with the conventional techniques and conventional micro-PIV (Particle Image Velocimetry) is still difficult due to the limited optical access to the microscale flow fields. Since Santiago *et al* (1998), micro-PIV flow velocity measurements have remained mainly limited to the 2C velocity vector field realizations. In this study, third component of the velocity i.e. out-of-plane velocity extraction from two-dimensional time resolved (TR) micro-PIV images is proposed. The method is based on PIV and performs cross-correlation (CC) peak height tracking inside the small ensembles of the TR-PIV flow images. This concept was verified basically by the simulation employing synthetic micro TR-PIV images. It was also demonstrated by an experiment performed on a microscale fluid flow inside a $100\mu\text{m}$ diameter inclined micro tube. Despite the inevitable background noise which effects the measurement negatively, extracted steady-state depthwise velocity profile was in agreement with the analytical result.

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