

마이크로유체소자 내부의 3차원 입자추적 및 3차원 유동장 측정기법 개발

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Development of Detection Method of 3D Particle-Positions and 3D Microflow Diagnostic Method in a Microfluidics

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Key Words: Microflow(마이크로유동), 3D Flow measurement (3차원 유동측정), Defocusing concept

Abstract : This paper reports a detection method of 3D particle-positions and a 3D microflow diagnostic method in a microfluidic device or a microvolume. The main idea of this method is to use the defocusing concept by using three apertures and the apertures can allow one to get an image with 3D information of particles. This paper describes a simple system setup and an easy way to get 3D particle locations by using the defocusing concept. Just a plate with three apertures was placed on an objective lens. In this study, calibration-based defocusing method has been developed in stead of formulas which was introduced by geometrical analysis in previous studies. Particle trajectory with time and three dimensional velocity vectors were calculated in a micro backward facing step.

단일 광경로 스캔PIV 기법의 개발

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Development of Single optical axis scanning PIV method

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Key Words: PIV(입자영상속도계), Single optical axis(단일 광경로), Scanning method(스캔 기법)

Abstract : PIV(Particle image velocimetry) measures the flow velocity of whole fields in a fraction of a second. By the development of digital image processing and optics, it is a unique method to capture the flow structure in complex flow and measure the turbulent properties with good accuracy. Conventional PIV method uses two optical axis configuration during the image grabbing process. That is, the illumination plane and the recording plane must be parallel. This configuration is very natural to grab the whole field without the image distortion. In the real problem, it is often to meet the situation which this configuration is hard to be fulfilled. In this study, we developed new PIV method which uses only single optical axis to grab the particle images. One particle image consists of scanned several line images and by repeating this scanning process, two particle images were grabbed and processed to produce the velocity vectors.