

マイクロチャネルの流動測定装置

Specification for Micro Channel Flow Measurement Device

1. General

(1) General Provision

The applications of microfluidics are among the greatest engineering challenges of the century and include drug discovery efforts, typing of single nucleotide polymorphisms for genetically-based drug prescription, fundamental genetics research, and proteomics. The field lies at the interfaces between engineering, chemistry, and biology; and aims to develop lab-on-a-chip systems. For proper design and optimization of such systems it is of great importance to understand the nature of the flow field within such microscale devices, however this is typically only performed in one plane and flows are assumed to be steady and 2-dimensional. Often these assumptions are not valid, and significant benefits in understanding would be gained from the ability to perform time-resolved visualization and measurements of the 3-dimensional (3D) flow field within the microchannels. For this reason, the Micro/Bio/Nanofluidics Unit at OIST seeks to acquire a high-speed stereoscopic instantaneous 3-dimensional, 3-component (3D3C) micro-particle image velocimetry (micro-PIV) system.

This document describes the required specification for the performance of the stereoscopic 3D3C flow velocimetry system.

(2) Configuration

Stereoscopic and instantaneous 3D3C flow velocimetry Imaging System	1 set
2-1. Main unit	1 unit
2-1-1. Stereoscopic Microscope	
2-1-2. Dual Pulsed laser	
2-1-3. Laser timing stabilizer	
2-1-4. Programmable timing unit	
2-1-5. Two high speed cameras	
2-2. Control software	1 unit
2-2-1. User interface software	

(3) Specifications and Performances

3-1. System specifications and performances

- The stereo microscope system must have a motorized z stage for focusing, a 20x zoom, appropriate filter cube for the 527 nm laser wavelength, coaxial illumination and a switch to transfer between laser and coaxial illumination
- The microscope system must be supplied with 1x, and 2.3x plan-apochromat objective lenses and be capable of accommodating two large high-speed cameras
- The microscope system must be supplied with a micro calibration plate
- The dual cavity laser must have a wavelength of 527 nm, an energy of 2 x 22.5 mJ at 1kHz, pulse width 170 ns, repetition rate 10 kHz per cavity, have a water/air chiller and be supplied with an optical fiber suitable for connection to the microscope
- The dual cavity laser must be supplied with a laser timing stabilizer with 1 ns resolution, a minimum correctable time step of 750 ns, and fiber-optic coupling to the laser
- The laser timing stabilizer must eliminate systematic timing errors due to variations in the delay between triggering a laser and its light output and allow variation of time between laser pulses (dt) during recording (to match dt to different flow speeds)
- The programmable timing unit must have a minimum pulse width 10 ns, minimum pulse interval 10 ns, jitter < 1 ns and a frequency range spanning 0.01 Hz to 1 MHz.
- The two high speed cameras should each have a resolution 1280x800 pixels, a frame rate of 5200/s at full resolution, 12-bit digital output, 18 Gb onboard memory, an Ethernet interface, and be supplied with appropriate cables and interface cards.

3-2. System Software

- System control software must provide the following functions;
 - The system must be compatible with PC system and LaVision, Davis software already in current use in the Shen Unit laboratory
 - Additional module for Laser-induced fluorescence (LIF) analysis

(4) Place of delivery

A Place designated by the school personnel at Okinawa Institute of Science and Technology Graduate University School (1919-1, Tancha, Onna-son, Kunigami-gun, Okinawa, Okinawa Institute of Science and Technology Graduate University School).

(5) Delivery deadline

July 31, 2019

2. Test and Inspection

After delivery, the vendor must test the system before the school personnel, and must comply with the specifications that are written in this specification sheet. The vendor must gain the school personnel's approval for the test items and methods by submitting the test plan.

3. Operating Instruction

After succeeding the test, the vendor must explain the operating and maintenance methods. The vendor must be able to conduct the explanation in English.

4. Documents to be submitted

Operation manual in English as PDF file

5. Warranty

One year (Except for consumable items)

6. Customer Support

After sales customer support must be available in English

7. Others

If questions on specification that are not written in this specification sheet should arise, both parties will conduct mutual consultation, and the vendor must fulfill the will of this school to the extent possible.

The vendor must submit the delivery plan to the school's facility personnel beforehand, and give sufficient consideration to the existing facility by using sheet curing etc.

The vendor must collect packaging materials and wood scraps.

The vendor must pay for the cost of delivery and pipe arrangement for installation.

If special tools are required for the usual operation and maintenance, the vendor must supply them at the delivery.