Dual electronic shutters for combustion field PIV measurement

This newly developed camera system, unlike conventional PIV cameras, is suitable for PIV measurement of flow field against a high-brightness background due to plasma emission, combustion, sunlight, etc. While conventional digital PIV cameras acquire the 2nd particle image only with their electronic shutter disabled, the FtrDSC is capable of activating its dual electronic shutters independently in the acquisition of both 1st and 2nd particle images, thus realizing optimum PIV imaging without CCD saturation.

Features

- Suitable for PIV imaging of the flow field in a high-brightness background due to plasma emission, combustion, sunlight, etc.
- Dual electronic shutters for independent exposure.
- Ethernet interface using ethernet cables and a switching hub.
- High-resolution, high-sensitivity CCD (1.3 megapixel).
- PIV mode for quick installation and easy settings.
- C-mount for versatile lens selection.
- PIV imaging with on-site image rotation and inversion to reduce post-processing.
- "FtrCAM" camera control software available, customized for PIV measurement.
- Wizard functions in FtrCAM for camera-calibration imaging and particle imaging.

*The design and size of the product are subject to change without notice.*
Dual-shutter CCD calibration
Auto-calibration of dual-shutter CCD element

FtrDSC is capable of auto-calibration of the dual-shutter CCD element. This is essential to PIV measurements, where sub-pixel accuracy for displacement measurement is required.

Application example
Visualization of the DC-RF hybrid plasma flow system

Qg=4 Sl/min
DC plasma jet with particle injection

Courtesy of Dr. Nishiyama and Dr. Tanaka, Institute of Fluid Science, Tohoku University.

FtrDCS specifications

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<tr>
<th>Camera specifications</th>
<th>Digital delay generator specifications</th>
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| Sensor 1/3 monochrome IT CCD (ICX447) , progressive scan  | Inputs BNC connectors 5V C-MOS logic level  
* Selectable trigger pull-up resistor  
READY INPUT with 10KΩ Pull-up resistor |
| Communication Ethernet 1000BASE-T RJ-45 , GigE Vision Interface | Outputs BNC connectors 5V C-MOS logic level |
| Active pixels 1296 (h) × 966 (v)                          | Communication Ethernet 10BASE10/100 RJ-45 |
| Frame rate full frame 31 frames/sec.                      | Power AC 100 V– 220 V 50/60 Hz  |
| Pixel clock 51.32MHz                                      | Weight 3.2 kg |
| Lens mount C-mount                                        | Dimensions 44(H) × 350(W) × 300(D) mm |
| S/N ratio >54dB (Gain=0dB)                                |                                                                 |
| Power AC100V 50/60Hz AC adapter                            |                                                                 |
| Weight 340 g                                              |                                                                 |
| Dimensions 55(H) × 55(W) × 98.3(D) mm                     |                                                                 |

Cell size 3.75 (h) × 3.75 (v) μm
Dynamic range Up to 120 dB
Sensitivity 0.1 Lux (max. gain)
Master gain 0 dB to +21 dB
Electronic shutter Exposure time 11.49 ms to 31.761 ms

Setting example

Software specifications

Functions Specifications
Multiple cameras Maximum four (4) cameras, synchronized imaging
Real-time display Real-time display of image pairs of the same quality as those stored as files
Auto-shuttering Automated timing control for dual electronic shuttering and double-pulsed lasing
Timing chart Display of the timing chart for shuttering and lasing
Output image format BMP, JPEG, PNG, GIF, TIFF
CCD calibration Auto-calibration function for the dual-shutter CCD element to perform the procedures including camera-calibration imaging, parameter calculation and direct-mapping-based image correction
Easy mode Easy mode assisted by the wizard functions in FtrCAM for camera adjustment, camera-calibration imaging and particle imaging
Customization Flexible customization supported (optional)

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