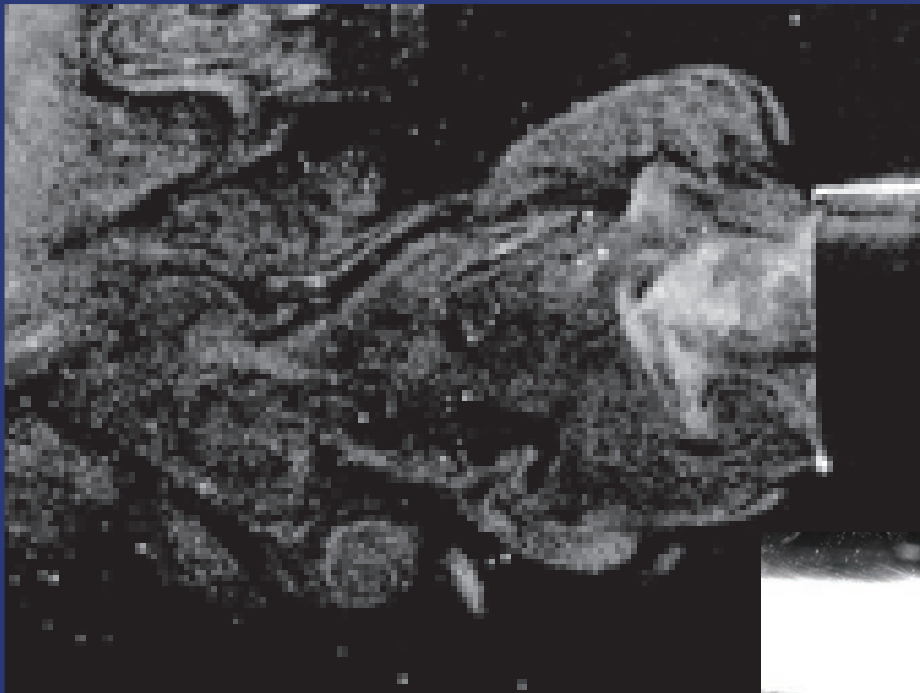


Dual electronic shutters for combustion field PIV measurement

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.



Combustion field imaging using FtrDSC



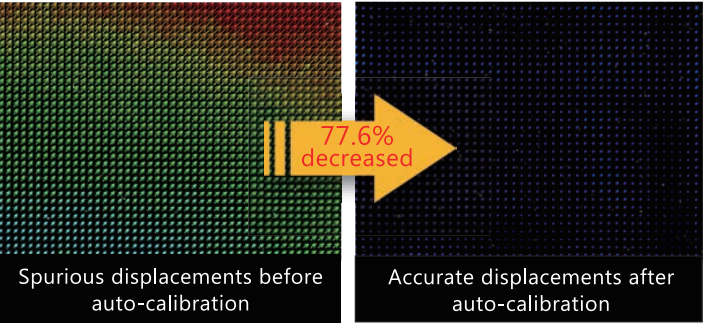
Imaging using a conventional PIV camera

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.

Dual-shutter CCD calibration

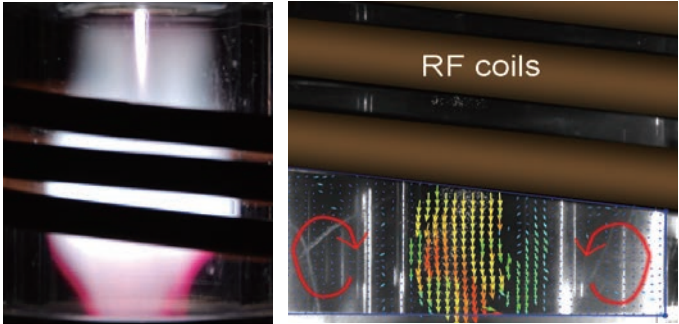
Auto-calibration of dual-shutter CCD element



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 SI/min

DC plasma jet with particle injection

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

FtrDCS specifications

Camera specifications

Sensor	1/3" monochrome IT CCD (ICX447) , progressive scan	Cell size	3.75 (h) × 3.75 (v) μm
Communication	Ethernet 1000BASE-T RJ-45 , GigE Vision Interface	Dynamic range	Up to 120 dB
Active pixels	1296 (h) × 966 (v)	Sensitivity	0.1 Lux (max. gain)
Frame rate full frame	31 frames / sec.	Master gain	0 dB to +21 dB
Pixel clock	51.324MHz	Electronic shutter Exposure time	11.49ms to 31.761ms
Lens mount	C-mount	Front view	Side view
S/N ratio	>54dB (Gain=0dB)	55	40
Power	AC100V 50/60Hz AC adapter	98.3	98.3
Weight	340 g	Rear view	Unit: mm
Dimensions	55(H) × 55(W) × 98.3(D) mm		

Digital delay generator specifications

Inputs	BNC connectors 5V C-MOS logic level * Selectable trigger pull up resistor READY INPUT with 10KΩ Pull up resistor
Outputs	BNC connectors 5V C-MOS logic level
Communication	Ethernet 10BASE10/100 RJ-45
Power	AC 100 V- 220 V 50/60 Hz
Weight	3.2 kg
Dimensions	44(H) × 350(W) × 300(D) mm

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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