LISST-HOLO2

Submersible Digital Holographic Particle Imaging System

• Particle Images

The LISST-HOLO2 is an advanced successor to Sequoia's original LISST-HOLO holographic camera system. The original in-line digital holographic camera was developed at the Marine Institute of the University of Plymouth (UK). The LISST-HOLO2 advances the original technology with fast 25 frames per second image capture, thus permitting detailed views of marine thin layers. The maximum tow-profiling speed is 4 knots. The instrument stores in-situ holograms of particles. Data offload and numerical reconstruction of the holograms gives in-focus, high resolution images of all particles from 25 µm to 2.5 mm equivalent spherical diameter.

• Particle Size and Volume Concentration

included in its large sample volume (~2 ml). Features as small as 4µm can often be resolved. The LISST-HOLO2 is particularly suited to the measurement of large, complex flocs and biological particles, due to its undisturbed, long 50mm clear optical pathlength. The high-speed frame capture combined with large sample volume permits a view of 46.5 mL of water each second. The built-in memory can hold nearly 100K holograms. To process the large number of holograms, a new algorithm ranks them by richness of image content. The software performs automatic focusing of particle images and the extraction of size distributions. From these images, shape parameters can be computed and particles may be manually identified, e.g. as plankton or flocculated sediment grains. The software HOLO Batch processes a selection of images; HOLO Detail enables detailed viewing of individual holograms. An easily installed Path Reduction Module may be used to extend use to higher particle concentrations. Unlike the original LISST-Holo and any other submersible holography system, LISST-HOLO2 uniquely includes a high-capacity rechargeable battery. The instrument may also be powered by an external power pack or instrument, such as a CTD. In short, LISST-HOLO2 is a truly powerful research tool.

LISST-HOLO2 Submersible Holographic Particle Imaging System

FEATURES

- In-situ digital in-line holographic technology
- Self-contained with internal datalogger and rechargeable battery
- Ethernet connection to PC for programmable data collection—no software is needed for programming or offloading data
- Automated ranking of collected images based on richness of data, permitting a user to view the most interesting holograms first
- Power via internal rechargeable NiMH battery pack or external power source
- Programmable data collection including Burst and Fixed Rate modes. Programmable Start and Stop conditions.
- Optical path length: 50 mm standard; Path Reduction Modules (PRM) available for high-concentration environments
- Sample volume: 1.86 cm^3 or 46.5 mL per second at 25Hz frame rate
- Data processing yields in-focus particle images and particle volume distribution
- Automated firmware updates possible when instrument is connected to the Internet

SPECIFICATIONS (subject to change without notice)

Parameters measured

- Particle images for observation and classification
- Particle volume distribution
- Temperature
- Depth

Size and concentration range

- 25-2500 µm equivalent spherical diameter, features down to 4µm
- Beam - c of 0 - 4 m^{-1}; ~0-50 mg/l (grain-size dependent)

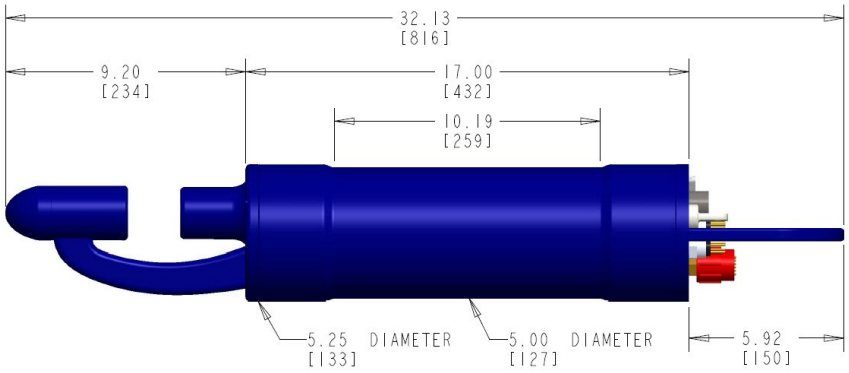
Technology

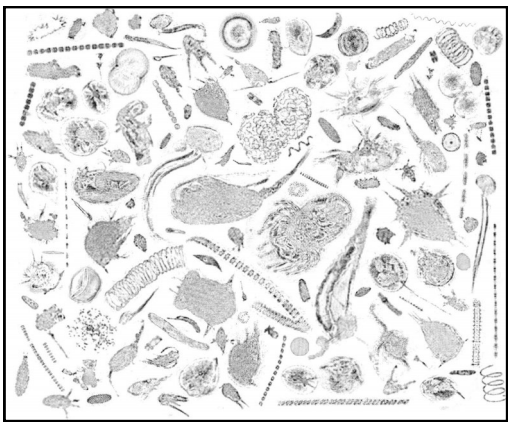
- Solid state diode laser @ 658 nm
- 4.4 µm pixel size digital camera; 1600 × 1200 pixels

Mechanical and electrical

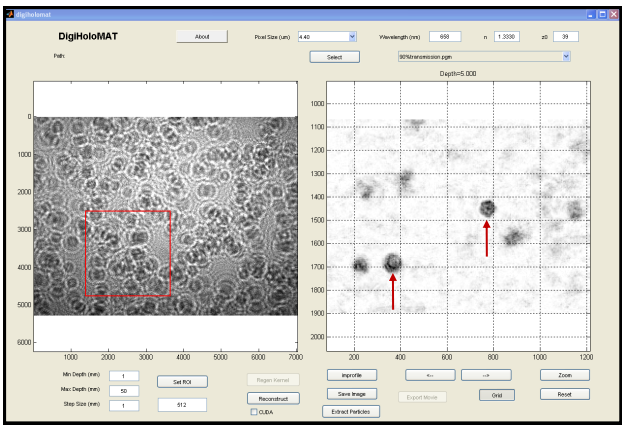
- Dimensions 13.3 cm (5.25") ∅ × 75 cm (29.5") L
- Weight: 9.5/3.6 kg (21/8 lbs) in air/water
- 600 m depth rating
- 237 GB internal solid state drive
- Internal rechargeable battery provides up to 20 hrs. continuous operation, also accepts external power, 12-24VDC
- Sampling rate: 25 frames per second
- Maximum water velocity: 2 m/s

The open LISST-HOLO2 optics design permits measurement of undisturbed fragile particles.





Composite of particle images from Monterey Bay. See the full details on the LISST-HOLO2 web page.



Detail of hologram reconstruction. Two particles, 75-90 µm in size are in focus at this image plane. Grid size is 200

LISST-HOLO2 optional accessory: Path Reduction Module

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