

ПІДСЕКЦІЯ ФІЗИКО-МАТЕМАТИЧНИХ НАУК**HOLOGRAPHIC THERMOPLASTIC INTERFEROMETER**

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The laser Holographic Thermoplastic Interferometer HTI is designed as an optical phase shifts space distribution measuring system for installing in scientific and control departments. It meets the need for a high precision but easy-to-use optical phase shifts measuring system. The main feature of the system is many times using of high sensitive thermoplastic film on a glass substrate. Hologram of initial state of testing object or sample object is registrated in situ on this film and after development one can see and measure all phase changes of the tested object or differences compared to the sample object.

HTI can operates in two modes: REFLECTIVE mode for mirror or diffusive objects and TRANSLUCENT mode for transparent clear or diffusive objects. The He-Ne laser used operates at a wavelength of $\lambda = 632.8\text{nm}$, so one half interference fringes sensitivity for REFLECTIVE mode is about $30 - 160\text{ nm}$, for TRANSLUCENT mode — $\lambda/2 = 316\text{ nm}$. This values may be increased up to 5 times by means of computer interpolation. For example, it is possible to measure the refractive index for clear object with accuracy up to 10^{-6} .

SPECIAL FEATURES

- Measurements as well as reflective and transparent objects
- High accuracy of measurements
- Using low-power He-Ne laser
- Operation under normal environmental conditions, including lighting
- No mechanical, electrical and thermal interference with measuring environment
- Complete immunity to electromagnetic interference
- Quick dry development without film shrinkage
- One measuring beam, no problems with it displacement
- Stable construction, small size and weight
- Remote manual or computer control
- Closed sealed dust-proof construction of writing camera

APPLICATIONS

- Investigations of object space-time changes under various physical, chemical or biological influences
- Thermomechanical tensions and shifts control
- Thermomasstransfer control
- Optical articles control and comparison
- Refractometry of liquids and gases
- Surface roughness measurements

TECHNICAL DATA

- Measuring range:
 - reflective set (open optical channel length), mm 75 — 800
 - translucent set (object thickness), mm 0 — 75
- Resolution at object plane, mm 0.05
- Sensitivity:
 - reflective set (angles 15° - 45°), nm 30—150
 - translucent set, nm 300
- Wavelength, nm 632.8
- Measuring beam diameter, mm 4 — 40
- Power (factory preset) 105—247 V, 48 — 62 Hz

OPERATING

He-Ne laser beam is splitted in optical set on reference and object beams. Expanded reference beam gets to the Film Plate (FP). Expanded object beam gets out and illuminates the testing area of the object. Reflected or transmitted by object light gets to the FP and TV-camera. After hologram registration reconstructed object beam gets to TV-camera too. The differences between this two coherent wavefronts cause the interference fringes of various lateral frequencies. The obtained interference pattern corresponds to the object surface (REFLECTIVE mode) or volume (TRANSLUCENT mode) changes, because the fringes lateral frequency at one point of image and the light phase shift at the same point of object is proportional.