
IMAGE HOLOGRAPHY IN THE
EDUCATIONAL PROCESS OF SAI
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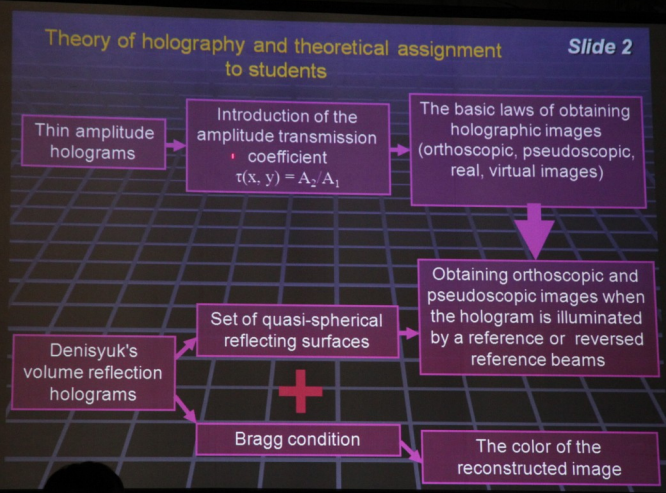
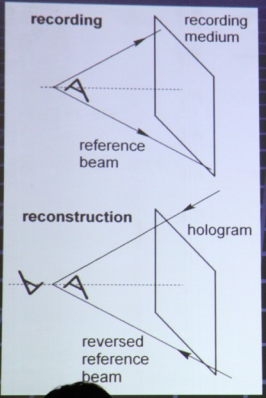

Theory of holography and theoretical assignment to students
Slide 2
Thin amplitude holograms
Introduction of the amplitude transmission coefficient
τ(x, y) = A2 / A1
The basic laws of obtaining holographic images (orthoscopic, pseudoscopic, real, virtual images)
Obtaining orthoscopic and pseudoscopic images when the hologram is illuminated by a reference or reversed reference beams
Set of quasi-spherical reflecting surfaces
Denisyuk's volume reflection holograms
Bragg condition
The color of the reconstructed image

Slide 4

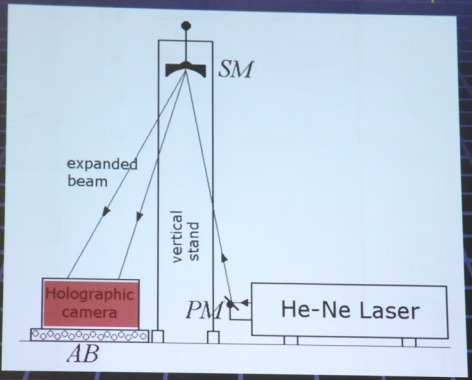
Example of a theoretical assignment to students

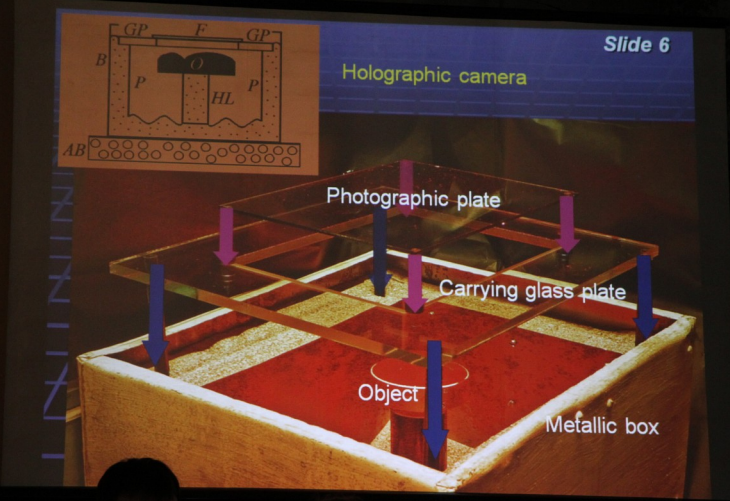


Tatiana Latychevskaia and Hans-Werner Fink, "Solution to the Twin Image Problem in Holography", *Physical review letters*, vol. 98, p. 233901, (2007)

Slide 5

Holographic experiment. Experimental setup.




Slide 6
Holographic camera
GP
F
GP
B
O
P
P
HL
AB
Photographic plate
Carrying glass plate
Object
Metallic box

Study of holographic image properties

Slide 7

1) Observation of appearance of the holographic image at final drying the hologram. Students watch the appearance of a holographic image, change in its brightness, color and localization over the photographic plate surface

2) Observation of orthoscopic and pseudoscopic images. When drying the photoemulsion layer finishes and changes in the orthoscopic holographic image cease, students turn the holograms by the photoemulsion surface towards the illuminating source and observe the pseudoscopic image. They watch essential varieties in the properties of the images reconstructed from different hologram sides.

3) Observation of the holographic image when the illuminating beam angle of incidence is changed. Watching the virtual image, students notice color change of the holographic image while the hologram is been rotating about the horizontal and vertical axes.

4) Observation of holographic image properties under changes of the wavefront curvature and the relative extent of illuminating source. Students may see changes in the orthoscopic image as the hologram is approaching the light source. They pay attention to the object image size, the distance between the object image and the hologram, and the reconstructed image sharpness.

5) Observation of the holographic image with an increasing dampness of the photoemulsion layer. Students watch color changes of the virtual reconstructed image after carefully breathing on the surface of the photographic plate.

6) Observation of the holographic image upon the photoemulsion layer heating-up. In this case the photographic plate is heated up by an air stream up to 80ºC. Students watch the shift of the virtual image color to a short-wave region of the visible light spectrum.

Slide 8

Conclusion

High operational characteristics of the holographic camera and the simplicity of its control have allowed to ensure the successful training of students in the field of holography.

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