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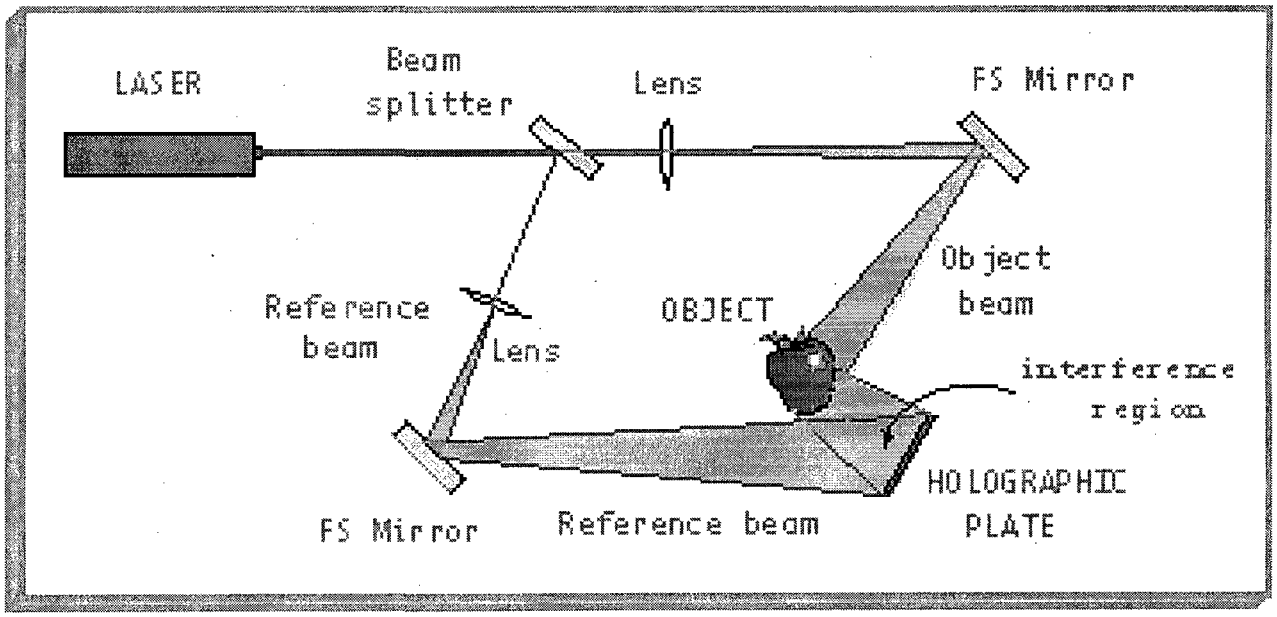
Thus says the Lord:
"Let not the wise man glory in his wisdom, Let not the mighty man glory in his might, Nor let the rich man glory in his riches; but let him who glories glory in this, that he understands and knows ME, . . . " (jeremiah 9:23-24)

history of holography:

Holography dates from **1947**, when British/Hungarian scientist Dennis Gabor developed the theory of holography while working to improve the resolution of an electron microscope. Gabor, who characterized his work as "an experiment in serendipity" that was "begun too soon," coined the term hologram from the Greek words holos, meaning "whole," and gramma, meaning "message." Gabor's first paper on holography evoked immediate response from scientists worldwide. He won the Nobel prize in the 70's. Among those who made important contributions to the development of the technique were G.L. Rogers, A.B. Baez, H. El-Sum, P. Kirkpatrick and M.E. Haine. In these early years, the mercury arc lamp was the most coherent light source available for making holograms. Because of the low coherency of this light, it was not possible to produce holograms of any depth, thus restricting research. Despite equipment limitations, these researchers identified many of the properties of holography and further elaborated on Gabor's theory. Most important, they extended their understanding of the process and its potential to another generation of scientists. Gabor's holography was limited to film transparencies using a mercury arc lamp as the light source. His holograms contained distortions and an extraneous twin image. Further development in the field was stymied during the next decade because light sources available at the time were not truly "coherent" (monochromatic or one-color, from a single point, and of a single wavelength). This barrier was overcome in **1960** with the invention of the laser, whose pure, intense light was ideal for making holograms. For the next ten years, holography techniques and applications mushroomed.

HOLOGRAPHY (setup)



A hologram:

It is a light wave interference pattern recorded on photographic film that can produce a 3-dimensional image when illuminated properly. Basically, holography uses coherent light such as that from a laser to produce an image by interference which is called a hologram. These images are unique, 3D, can be segmented because any part contains whole image and with the use of different wavelengths are scalable.

Physics (cool stuff)

let

$$a(x,y) = |a(x,y)| \exp[-i\varphi(x,y)]$$

represent the wavefront of the image on the film (in xy plane).
Next let :

$$A(x,y) = |A(x,y)| \exp[-i\psi(x,y)]$$

represent the reference beam on the surface of the film.
The two wavefronts interfere and produce the following intensities on the film:

$$I(x,y) = |A(x,y)|^2 + |a(x,y)|^2 + 2|A(x,y)|\,|a(x,y)| \cos[\psi(x,y) - \varphi(x,y)]$$

How is it made:

-A laser beam is **split** into two beams: {see diagram above}
-The **reference beam** is spread by a lens or curved mirror and aimed **directly at the film plate**
-The **object beam** is spread and aimed at the object. The object reflects some of the light on the holographic film-plate. The two beams interact forming an interference pattern on the film.

What are the main types of holograms?

Transmission Holograms: Viewable with laser light. They are made with both beams approaching the film from the SAME side. Which is my setup
Reflection (White Light) Holograms: Viewable with white light from a suitable source such as spotlight, flashlight, the sun, etc. They are made with the two beams approaching the holographic film from OPPOSITE sides. Poor man's setup!
Multiple channel holograms: Two or more images are visible from different angles. There are numerous types of multiple channel holograms.
Real Image Holograms (H-2's)
These are usually reflection holograms made from a transmission original (H-1). The image dramatically projects *IN FRONT OF THE PLATE* toward the viewer. Most holograms in holography museums are of this type. The procedure for making them is quite elaborate and demands precise control of angles.

Some applications:

Holographic Art--Holography museums, advertising, postage stamps, jewelry, etc.
Security from Forgery--Credit cards, tickets, etc.
Optical Devices--Holographic lenses, diffraction gratings, etc. These are holograms in which the "object" is a mirror or a lens. A flat mirror as an object produces a diffraction grating. A lens or a concave mirror as the object produce a hologram that behaves LIKE A LENS! These HOLOGRAPHIC LENSES are lighter than traditional lenses and mirrors and they can be designed to perform more specialized functions such as making the panel instruments of a car visible in the windshield for enhanced safety.
Holographic Interferometry--A very precise technique for measuring changes in the dimensions of an object. Useful in industrial stress analysis, quality control, etc.
Medical Applications--Combining CAT scans into a 3-dimensional image, A multiplex. Ultrasound holography, etc.

What I will be doing:

1) Create my own holograms (so that in the process I optimize my setup)
2) Proceed onward to vibrational holography by use of a *vibrating plate.*

bibliography :

ask me