

HOLOGRAPHY

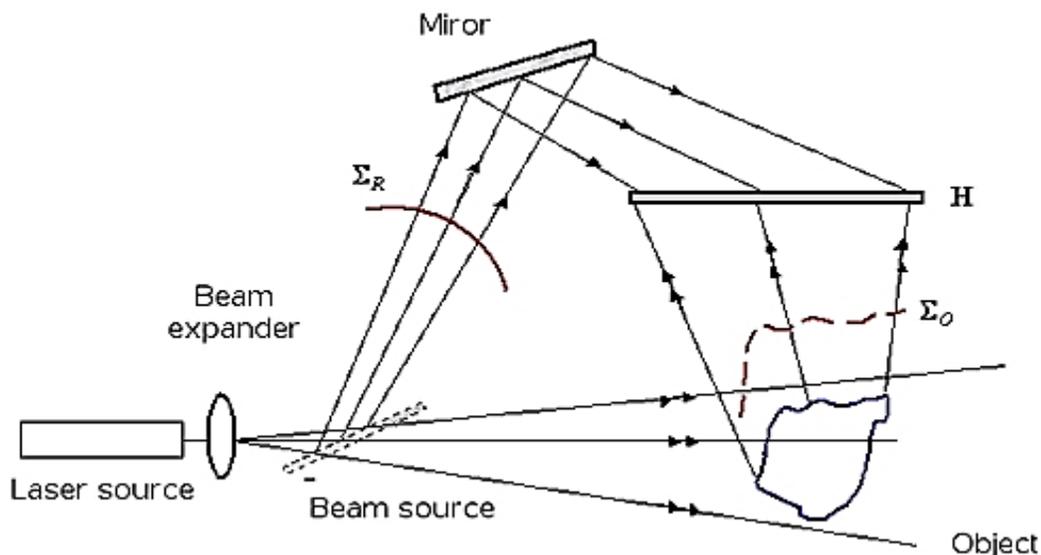
Holography technique is used to obtain 3D image of an object. Holography is the science and practice of making holograms. Holography is actually a recording of interference pattern formed between two beams of coherent light coming from the same source. In this process, both the amplitude and phase components of light wave are recorded on a light sensitive medium such as a photographic plate. The recording is known as a hologram. Holography requires an intense coherent light source (i.e. laser).

It is a two step process. In the first step, recording of hologram is done where the object is transformed into a photographic record and the second step is the reconstruction in which the hologram is transformed into image.

RECORDING OF A HOLOGRAM

The recording of a hologram is based on the phenomenon of interference. It requires a laser source, a plane mirror or beam splitter, an object and a photographic plate. A laser beam from the laser source is incident on a plane mirror or beam splitter. The function of the beam splitter is to split the laser beam. One part of splitted beam, after reflection from the beam splitter strikes on the photographic plate. This beam is called reference beam. While other part of splitted beam strikes on the photographic plate after suffering reflection from the various point of object. This beam is called object beam.

The object beam reflected from the object interferes with the reference beam when both the beams reach the photographic plate. The superposition of these two beams produces an interference pattern and this pattern is recorded on the photographic plate. The photographic plate with recorded interference pattern is called hologram. Photographic plate is also known as Gabor zone plate in honour of Denis Gabor who developed the phenomenon of holography.



RECONSTRUCTION OF A HOLOGRAM

In the reconstruction process, the hologram is illuminated by laser beam and this beam is called reconstruction beam. This beam is identical to reference beam used in construction of hologram. The hologram acts as a diffraction grating. The reconstruction beam will undergo phenomenon of diffraction during passes through the hologram. The reconstruction beam after passing through the hologram produces a real as well as virtual image of the object.

One of the diffracted beams emerging from the hologram appears to diverge from an apparent object when project back. Thus, virtual image is formed behind the hologram at the original side of the object and a real image in front of the hologram. Thus an observer sees light waves diverging from the virtual image and the image is identical to the object. If the observer moves round the virtual image then other sides of the object which were not noticed earlier would be observed. Therefore, the virtual image exhibits all the true three dimensional characteristics. The real image can be recorded on a photographic plate.

