Study of Image Characteristics with Coherent Illuminated Symmetrical Trapezoid and Bar Targets

The study of coherent optical system is started with invent of laser tool. Coherent image formation was studied even earlier, but there was a momentum in the studies after the advent of laser. Since then, coherent optical system is in demand for its applications in holographic imaging, coherent optical processing, laser reading, recording and display devices, and coherent optical memories. In certain imaging situations, it is advantageous to use coherent illumination of the object such as certain applications of photography at high speed, front illumination under intense background light, and illumination of photo sensitive materials. An optical image forming system can be regarded as a linear system only in the extreme conditions. In case of coherent illumination, optical system is linear in object and image amplitudes. There pupil function play important role. In this paper, image formation with coherent light using non-periodic targets namely symmetrical trapezoid and symmetrical bar target is discussed. Intensity image distribution against image plane co-ordinate is computed for various values of apodisation parameter. From the numerical results, it is clear that degradiation in the image is observed when apodisation parameter is low. In all the cases, oscillations attain maximum intensity around. In the case of bar target, Gibb's oscillations are observed around maximum intensity level. Width of oscillations increases as width of target increases.

Key words: Fourier optics, Apodisation, Coherent illumination, Pupil function, Condition of linearity, Gibb's oscillations.