

TITLE :- Lloyd's Mirror - interference by division of wavefront

Interference can happen in two ways by division of wavefront ^{or by division of amplitude}. Lloyd's mirror is an example of interference by division of wavefront. A suitably placed mirror is used to create ~~image~~ a change in the phase of the wavefronts coming from a source which interfere with wavefronts, coming directly from the source.

The interfering sources are the slit and its mirror image formed by the mirror. A suitable mirror is the surface of a piece of plate glass, at least a foot long. With a shorter mirror, diffraction effects are very disturbing. The plate glass surface must be carefully selected.

Feature of the experiment

Lloyd's mirror has two distinctive features. The reflected rays suffer a phase change of one-half wavelength on reflection, so that the centre of system of bands is not in the ~~field~~ plane of the mirror. Also if the slits have a finite width, the upper edge of the slit and the lower edge of its image interfere with each other and vice-versa.

The Lloyd's Mirror and vice-versa.

condition for constructive and destructive interference

The Lloyd's Mirror is equivalent to the Young's double-slit experiment with the distance between slits replaced by the distance between the slit and its image, which will be equal to twice the distance of slit from the mirror. Image and object are equidistant from a plane mirror. So assuming these new conditions, the required condition can be calculated. But we must not forget to add an extra half wavelength in the path difference (caused by reflection) from the mirror.

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