Multiple-Beam Lateral-Shear Interferometer

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Multiple-Beam Lateral-Shear Interferometer*

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An interference arrangement for observing the gradient of a phase object is described. A Ronchi grating is imaged, through the phase object under examination, on a photographic plate. The grating lines are distorted due to the phase variations of the object. These distortions are linearly proportional to the distance between the grating and the phase object. Two exposures are made on the same photographic plate. The phase object is displaced longitudinally after the first exposure. After developing the plate, it is observed in a spatial filtering setup with a frequency plane mask that cuts off all but one of the diffracted orders. A lateral-shear interferogram of the phase object is obtained in a plane conjugate of the photographic plate.

A multiple shear interferogram of the phase object can be obtained by recording a number of exposures (instead of only two) with equal longitudinal displacement of the object after each exposure. The experiment can be carried out by using two crossed gratings or a ground glass in place of a single grating. The recording procedure remains unchanged. The frequency plane aperture employed for observation selects a particular frequency out of the ensemble that constitutes the ground glass. The sensitivity of the method and the direction along which the gradient is measured can be varied by modifying respectively the distance of the Fourier plane aperture from the optical axis and its azimuth.