

# A Laser Diode Illumination Source Suitable for Interferometry

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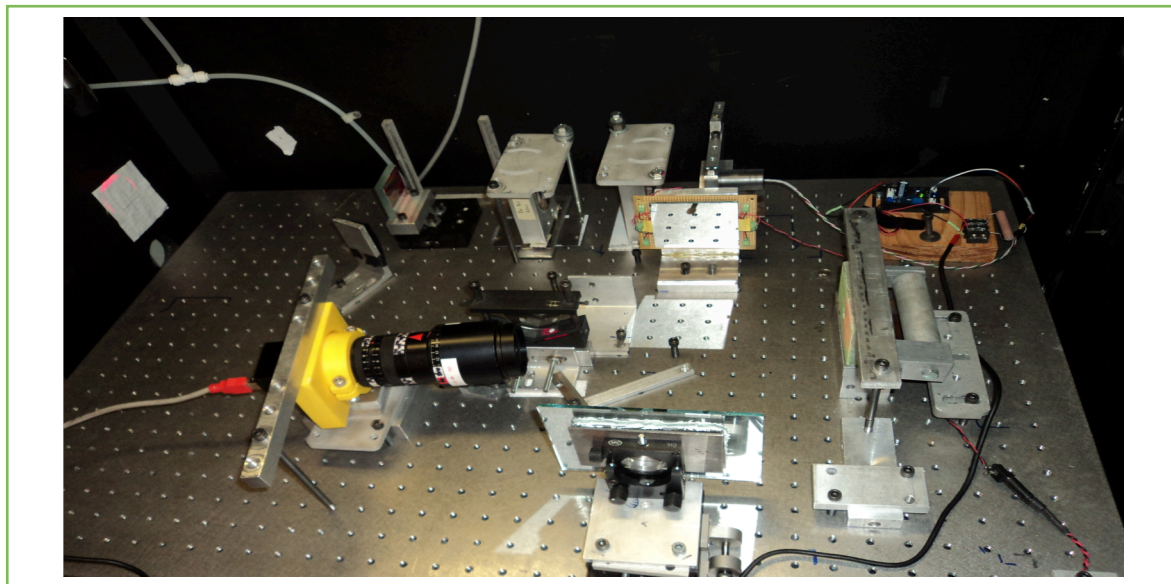


Figure 1: The test equipment

Electronic Speckle Pattern Interferometry (ESPI) is an optical method that uses a laser beam to measure very small surface deformations. In this method the difference between the distances traveled by two waves is measured through interference.

The use of a blazed reflective diffraction grating is explored as a means to compensate for the difference in the optical path lengths between two split beams in an achromatic interferometer used for in-plane ESPI measurements. A diffraction grating placed in front of the beam splitter has two desirable features:

it allows the use of a laser diode with low coherence as the light source, and it produces a geometry in which all light rays traveling inside the interferometer have the same optical path lengths. This makes the interferometer suitable for interferometry over extended surface area. A method to find the coherence interval of the laser diode is also described so as to achieve the fringe patterns with the highest visibility throughout the measured images.

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