

## Original Paper

# Employing of Diode Lasers in Speckle Photography and Application of FFT in Measurements

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### Abstract

The paper discusses the spectral correlation of the speckle patterns that have been produced by illuminating different surfaces with the diode laser at different tuning range of wavelengths. The diode laser could induce a shift in the wavelength value by raising the temperature of the laser cavity using a temperature controller. Young's interference fringes could be obtained by applying the Fast Fourier transform to the spectral correlated speckle patterns, and the visibility of the interference fringes was found to be proportional to the surface roughness values of the objects of interest and the deviation in the wavelengths used in the illumination. Both the experimental and theoretical values of the standard surfaces used in the experimental work were compared. The system of the speckle photography and the diode laser as a coherent illuminating source provided good accuracy for measuring the surface roughness values greater than 1  $\mu\text{m}$ . Theory, method, results, and uncertainty are presented in details.

### Keywords

Speckle photography – Diode laser – Surface roughness – Fourier transform