

## Original Paper

# Speckle Photography in Measuring Thermal Expansion

M. Abdel Hady<sup>1</sup>, M. Necklawi<sup>2</sup>, A. Fahim<sup>2</sup>, M. Bahrawi<sup>1</sup> and N. Farid<sup>1</sup> 

(1) Dimensional Metrology, National Institute For Standards, Tersa St, Haram, P.O.B 136, Giza, 12211, Egypt

(2) Department of Physics, Faculty of Science, Helwan University, Giza, Egypt

 N. Farid

Email: [niveen\\_farid@hotmail.com](mailto:niveen_farid@hotmail.com)

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### Abstract

Sufficient information on status and behavior of a material used in establishing bridges, rails, and buildings, is of a special significance. In the present work, the material's thermal expansion is the parameter of particular interest. Multiple wavelength speckle photography with digital recording system is a reliable technique for nondestructive testing. The thermal expansion coefficients of different materials such as steel, copper, and aluminum are measured during heating process. Temperature increase causes variation in interference fringes' separation and direction for each wavelength. The Young's fringes produced by the Fourier transformation of the combined speckle patterns are analyzed and the results are in good precision. The percentage error in the measured thermal expansion values is 3 % which indicate the effectiveness of the proposed system for this purpose.

### Keywords

Speckle photography – Fourier transformation – Multi-wavelength technique – Thermal expansion