

Novel trends in optical non-destructive testing methods

P. Huke and Ralf B. Bergmann

Summary

Non-destructive testing (NdT) describes a wide range of principles and methods for measuring and comparing physical quantities against a nominal condition. Commonly NdT is related to the detection of defects in or on solid-state bodies. This may include hidden defects as well as optical appearance (reflectivity, absorbance, polarity), shape, stress, strain and many other characteristics. In many applications contactless NdT is advantageous due to the state of the object in question. Most often optical metrology, like shearography, reflectometry, vibrometry and laser ultrasound, is contactless or needs no physical contact to the measurement area. The optical NdT splits up in two categories. The first category needs no external force or energy to excite a signal related to the defect. Stimulated thermography and laser ultrasound are examples for this category. The NdT principles of the second category, e.g. shearography, reflectometry and vibrometry, need an excitation force, e.g. heat or mechanical vibrations introduced by transducers. In this paper we describe and compare different optical NdT-methods by their capability for different measurement tasks. Based on this we derive a categorization for optical NdT. Experimental results obtained with the methods used and developed in our institute will be shown.

