Long pulse excitation thermographic non-destructive evaluation

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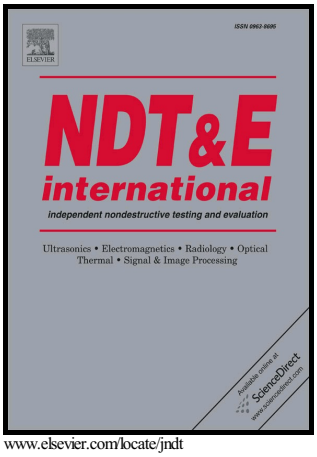

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Abstract

A comprehensive analysis of the defect detection performance of long pulse excitation thermographic NDE is presented. An analytical procedure for predicting the thermal image contrasts of defects of specified size and depth is developed and validated by extensive experimental studies of test pieces having a wide range of thermal properties. Results obtained using long pulse (~5 sec.) excitation are compared with those obtained using traditional flash excitation. The conditions necessary for the success of the long pulse method are explained and illustrated by both modelling and experimental results. Practical advantages of long pulse excitation are discussed.

Keywords

Thermography; Long pulse; Sensitivity

1, Introduction

The most widely used form of active thermographic non-destructive evaluation (NDE) employs the same short (~2 ms) pulse or flash excitation introduced by the pioneers [1, 2] of the technique in the early 1980s. Their work followed earlier studies of Green [3] in 1965 and Carlomagno and Berardi [4] in 1976. The history of the thermographic NDT techniques can be found in the recent review by Vavilov and Burleigh [5]. Following the flash heating of a component under