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Pulsed Thermal Methods for Materials Characterization

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Abstract

Active, dynamic thermography is a field that is in rapid development due to its attractive features in applications, namely non-contact operation, large field testing and high speed. Recent developments in infrared camera technology and image processing power support the industrial interest further.

In the contribution, the basics of dynamic thermal testing techniques will be shortly reviewed. Important quantities and relations determining acquisition times and detectable defect size and defect depths will be discussed, supported by a comprehensive numerical simulation of a typical testing situation under pulsed excitation.

Examples for testing of different materials for delaminations, coating thickness, coating damage and cracks will give an impression of the widespread applicability in industry. Analytical and numerical techniques allow prediction of optimized testing parameters for the quantities addressed.

Materials characterization, like determination of porosity or unwanted phases in metals is an upcoming field which will shortly be presented.

Finally, an outlook to new excitation schemes as ultrasonically excited thermal processes will be given. These allow fast defect recognition with good contrast.