Improved ultrasound activated lockin-thermography using frequency analysis of material defects

by A. Gleiter, C. Spießberger, Th. Zweschper, and G. Busse

Institute for Polymer Testing and Polymer Science, Department of Non-Destructive Testing (IKP-ZFP), University of Stuttgart, Pfaffenwaldring 32, D-70569 Stuttgart, Germany, Tel.: +49-711/685-69711, Fax: +49-711/685-64635,
E-Mail: gleiter@ikp.uni-stuttgart.de

Abstract

Ultrasound activated thermography is based on intense acoustic wave interaction with defects. Internal friction in defect areas results in a local temperature rise. The lockin-approach is applied by using a low-frequency amplitude modulation of acoustic excitation to enhance the sensitivity of detection of faint heat sources (ultrasound lockin-thermography).

A new approach to detect damaged regions includes frequency dependence of heat production: defects like cracks show characteristic frequencies of maximal mechanical losses. In order to activate all defects, a wideband frequency-sweep is used. Intact regions of the material do not significantly change their properties with frequency, so that a defect selective methodology is obtained.

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