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Simultaneous measurement of thermal conductivity and diffusivity of good thermal conductors using laser spot lock-in thermography.

The application of the laser-spot active lock-in infrared thermography technique in a front detection configuration for the simultaneous measurement of the thermal conductivity (k) and diffusivity (D) of isotropic solids taking advantage of the heat losses by conduction from the sample to the surrounding air has been reported recently []. In this method, an intensity periodically modulated laser beam focused on the sample´s surface is partially absorbed and transformed into heat so that thermal waves are generated that propagate radially from the heating point. They are imaged using a thermographic camera at the same surface where the excitation took place. Video-thermograms are recorded at the light modulation frequency, from which amplitude and phase-shift profiles are obtained by lock-in processing as a function of the radial distance from the heating point. These profiles are then fitted with the help of a theoretical model to obtain k and D. However, the method is limited to thermal insulators for which a large mismatch between their thermal diffusivities and that of air exists so that for good conductors only the latter parameter can be recovered.

Keywords

lock-in thermography diffusivity conductivity measurement

Reference

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Author approval

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Author will attend

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