

## Flash Thermography of Aerospace Composites

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### ABSTRACT

In the past decade, thermography has become a widely accepted inspection technique for both manufacturing and maintenance of aerospace composites. Optical flash thermography, where the sample surface is heated by a brief pulse of light, has emerged as the most widely implemented technique in the USA, as it is faster than step or modulated optical heating, and it facilitates quantitative measurement of thickness, depth or thermal diffusivity. For many polymer and ceramic matrix composite inspection applications, flash thermography has replaced traditional ultrasonic inspection. In part, the increased acceptance of flash thermography is the result of improved signal processing and analysis techniques. While early attempts at thermographic NDT were based on analysis of contrast in the post-heating image data sequence, modern systems treat each pixel as an independent time series, so that information about the state of a sample can be acquired from a single pixel, without the use of a reference standard. The Thermographic Signal Reconstruction (TSR) technique has been a particularly effective device for signal analysis. While the TSR signal itself provides only noise reduction, its first and second time derivatives provide a signature that is invariant to ambient conditions, surface preparation or input energy, and that reveal the presence of subsurface interfaces and their thermophysical properties.

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