

Ageing evaluation of Thermal Barrier Coating: comparison between Pulsed Thermography and Thermal Wave Interferometry.

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Abstract

Ceramic thermal barrier coatings (TBC) are widely applied for protecting from combustion gases hot path components of gas turbines for both aero- and land-based applications. In order to prevent the detachment of TBC, it would be essential to monitor their degradation in terms of sintering kinetic. As sintering strongly affects also the thermal diffusivity of TBC, the idea is to measure the latter parameter to account for the former.

The technique to measure thermal diffusivity variation with ageing was recently presented. Tests and results concerning the in-depth thermal diffusivity on TBC specimens artificially aged were reported. Pulsed Thermography together with the model that leads to the identification of diffusivity for both in-depth and lateral diffusion was used for that purpose. Thermal Wave Interferometry (TWI) is a photothermal technique used to evaluate thermal parameters when steady periodic conditions are applied to the material.

In the present work a recall of the main results obtained with the Pulsed Thermography for this application is given. After that the TWI technique is used to measure again the in-depth thermal diffusivity of the same samples artificially aged and yet tested with Pulsed Thermography. With this completely alternative and non-invasive technique we want to validate what was obtained in the previous work.

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