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Monitoring the Degradation by Fire of Composite Laminates by Embedded FBG Sensors

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Fire resistance is a critical requirement for some components of the aircraft structure, such as engine cowlings, meaning that the structural material must be able to contain an internal fire for at least 15 minutes, to allow the extinction system to extinguish the fire before it propagates to the structure. Composite materials degrade under fire, but the char layer is an effective low thermal conductivity protecting layer, insulating the material and delaying the degradation. Detailed mathematical models for the composite behavior are available, but to obtain accurate predictions, temperature dependent experimental parameters are requested. Only with knowledge of the internal temperature distribution a quantitative prediction can be done. Fiber optic sensors have a thickness similar to the lamina, and consequently can be embedded without disturbing the laminate. FBG sensors can withstand temperatures up to 900 Celsius for several minutes, so a detailed mapping of internal temperatures may be obtained. The paper describes the experimental setup and the obtained results on real aeronautic parts submitted to fire.

Ключевые слова:

Содержание.

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