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# Practical Application Study of an Impact Damage Detection System for an Airframe Composite Structure

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The basic technologies of the impact damage detection system (IDDS) of composite structures were developed and demonstrated using a composite structure with embedded small-diameter optical fiber sensors in FY2002. It is our idea that an impact damage occurrence, an impact location/area and a damage degree are evaluated using the change of optical intensity in an optical fiber and strain response measured by a fiber Bragg grating (FBG) sensor. In our current R&D, the IDDS consisting of optical fiber sensors installed in a composite structure and an interrogation unit is developed for practical airframe application. Under our plan to proceed towards product, the reliability, the durability and the reparability of our system as well as the downsizing of the interrogation unit are investigated.

In particular, many carbon fiber-reinforced plastic (CFRP) composite panels with embedded optical fibers or fiber Bragg grating (FBG) sensors are subjected to impact loadings, and the acquired reliability data is investigated for the estimation of an impact damage detection. The repair method of a composite structure with installed optical fiber sensors is also considered and a fundamental experiment is performed for some of our idea. Moreover, a refined trimmable optical fiber connector that can be embedded in a composite, and the function of a small-sized FBG sensor system with a revision specification will be evaluated through a trial production, an impact damage detection test and an environmental test.

**Ключевые слова:**

**Содержание.**

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