



M.S. Leonard, K.S. Brown

Damage Detection in a Bonded Composite Wing

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The Air Force's increased use of composite structures in military aircraft has lead to a need for monitoring the failure modes of these materials. However, the failure behavior of composites is not nearly as well characterized as metals and damage may be more difficult to detect. Areas of a structure where damage is known to occur are called "hot spots". These areas of concern may be locations where traditional NDE inspections cannot be performed or areas that are accessible only by the removal of other components, making the inspection very costly or time consuming. This paper presents results from laboratory testing and data analysis conducted on a representative composite wing structure. The test article is fabricated from graphite/epoxy with the upper and lower skins bonded to spars. This study involves subjecting the composite wing structure to manually induced disbands between the skin and spar. An array of piezoelectric sensors bonded to the wing skin is used to transmit and receive elastic waves throughout the structure and record healthy and damaged responses. A tomographic imaging method is applied to the response signals to locate and assess the size of the disbonded region.

Ключевые слова:

Содержание.

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