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Fusion of SHM techniques for synergetic degradation monitoring of composite aircraft wing structure under compression fatigue

Nan Yue, Agnes Broer, Georgios Galanopoulos, William Briand, Marc Rebillat, Theodoros Loutas, Dimitrios Zarouchas

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Title	Fusion of SHM techniques for synergetic degradation monitoring of composite aircraft wing structure under compression fatigue
Author keywords	aircraft structures fatigue degradation monitoring structural health monitoring fusion
Topics	Structural Health Monitoring, TS - Application of innovative health monitoring techniques
Abstract	In the pursue of smart structures for cyber-physical health management of lightweight engineering structures, a number of structural health monitoring methods have been developed. Each SHM technique has different coverage and sensitivity to certain types of damage. In particular, the structural degradation of composites under fatigue loading is multi-causal and intricate, and none of the techniques alone is able to fully capture the fatigue degradation phenomenon. This paper presents the considerations and results in a fusing strategy of two different SHM techniques, distributed optical strain sensing and guided wave, on the in-situ monitoring of an aircraft wing structure under compression-compression fatigue loading. The emergence and growth of localized damage (disbond of stiffener foot) and the degradation of mechanical performance (stiffness degradation) caused by the accumulation of distributed fatigue damage have been monitored in the synergy of the two different SHM techniques. The result shows that the fusion strategy unveils the fatigue degradation phenomenon in a more extensive manner than using two techniques separately.
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Authors							
first name	last name	email	country	affiliation	Web page	corresponding?	presenter
Nan	Yue	n.yue@tudelft.nl	Netherlands	Delft University of Technology		✓	✓
Agnes	Broer	a.a.r.broer@tudelft.nl	Netherlands	Delft University of Technology			
Georgios	Galanopoulos	gkgalanopoulos@gmail.com	Greece	University of Patras			
William	Briand	William.BRIAND@ensam.eu	France	HESAM University			
Marc	Rébillat	Marc.REBILLAT@ensam.eu	France	HESAM University			

Theodoros	Loutas	thloutas@upatras.gr	Greece	University of Patras			
Dimitrios	Zarouchas	D.Zarouchas@tudelft.nl	Netherlands	Delft University of Technology			
