

Highlights and Challenges in Damage Assessment of Composite Structures

W. Ostachowicz

Polish Academy of Sciences (IFFM)
Fiszera 14 st. Gdansk 80-231, Poland
e-mail: wieslaw.ostachowicz@imp.gda.pl, web page: <http://www.imp.gda.pl>

ABSTRACT

The paper presents multidisciplinary methods and techniques oriented towards damage identification and assessment in composite structures reinforced by carbon and glass fibres.

Damage is in the form of mechanical failures as cracks, delaminations, debonding, bridging, voids, etc.

Also methods dedicated to thermal degradation, moisture, fingerprint and chemical contamination are shown.

The paper reports applications of several methods as 3D laser vibrometry, active termography, electromechanical impedance, and terahertz spectroscopy. Presented methods are also suitable for performance of bonded joints assessment.

Particularly the investigations concern contaminated bonds caused by both manufacturing (e.g. release agent) and in-service contaminations (e.g. de-icer). Techniques for detection of weak bonds are presented together with signal processing approaches.

Promising combination of selected techniques lead to an innovative approach to ensure safety operation of structures.

Separate part of the paper is dedicated to influence of external factor (temperature, load) on investigated methods.

The characteristic of each method is summarized by a critical look giving advantages and disadvantages that need to be addressed in future research.