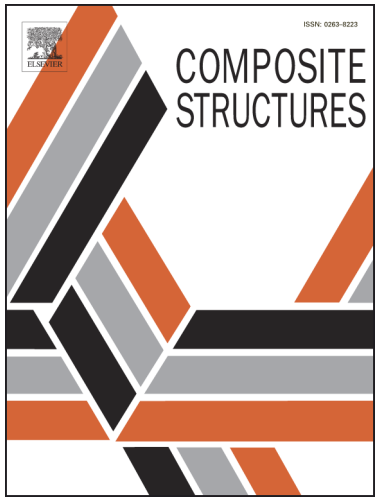

On the modal acoustic emission testing of composite structure

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PII: S0263-8223(16)00016-7
DOI: http://dx.doi.org/10.1016/j.compstruct.2016.01.003
Reference: COST 7108

To appear in: *Composite Structures*

Please cite this article as: Dahmene, F., Yaacoubi, S., El Mountassir, M., Bendaoud, N., Langlois, C., Bardoux, O., On the modal acoustic emission testing of composite structure, *Composite Structures* (2016), doi: http://dx.doi.org/10.1016/j.compstruct.2016.01.003

On the modal acoustic emission testing of composite structure

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Abstract

This paper concerns the use of Modal Acoustic Emission (MAE) on composite overwrapped pressure vessels (COPV). It investigates the physics of this approach, defined as a promising method that can provide further information to classical acoustic emission technique. The investigations are achieved on a small coupon and full scale specimens extracted from a COPV. The separation mode was previously performed using Pencil Lead Breaks (PLB) based on Continuous Wavelet Transform (CWT) analysis. It has been shown that extensional (S_0) and flexural (A_0) modes were successfully splitted and their frequency bandwidths are defined. After that, an appropriate algorithm was developed based on CWT analysis of the extracted AE signals coming from the region of damage. Results obtained by this method show a good agreement regarding the nature of damage and predominant mode expected during tensile test.

Keywords: *Modal acoustic emission, Acoustic emission, composite pressure vessels, wave mode.*

I. Introduction

Thanks to their attractive advantages (high specific strength, reasonable mechanical property…), composite structures are in increasing use in various fields. However, they are not immune to different structural defects, such as delamination, debonding, fiber fractures. Many nondestructive techniques can be used to contribute in preventive and curative maintenances of this kind of structures. AE, which is a phenomenon whereby transient elastic waves are generated by defect(s), occupies a strong position among these techniques. It finds one of its largest application fields in materials research. Examples are various and its applications lead to contribute to a better understanding of the structure / properties