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Acoustic emission signal denoising to improve damage analysis in glass fibre reinforced composites

Abida Satour, Silvio Montrésor, Mourad Bentahar, Rachid Elguerjouma, Fouad Boubenider

Abstract: In this contribution, continuous wavelet denoising technique is developed to enhancethe signal to noise ratio of acoustic emission (AE) signals. The time– frequency characteristics of the recorded noise are first determined by calculating the noisewavelet coefficients. Then, an algorithm able to proceed denoising by extracting noise features from those corresponding to AE signals is developed. The denoising procedure is applied to get meaningful signals when the detection threshold is decreased from 30 dB to 25 dB. Furthermore, the spectral flatness measure was applied to eliminate signals originating from noise. Experiments were conducted on cross-ply composite specimens [±45°]6S to examine the efficacy of the proposed technique. The denoised signals were analysed using the continuous wavelet transform and were also analysed in terms of the dominant frequency band which was processed by a fast Fouriertransform. Results show that denoised low-amplitude AE hits are well correlated withhigh-amplitude AE hits (A?30 dB) in terms of damage characterisation.

Keywords : acoustic emission, polymer-based composite, Denoising, Signal processing, damage characterisation