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Damage analysis of concrete structures by means of acoustic emissions technique.

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Abstract

The aim of this work is the evaluation of the damage to a concrete structure by Acoustic Emission (AE) signal analysis. In order to reduce the loss of AE signals and the waste of storage memory, multi-triggering and the adaptive acquisition time interval proposed in previous papers are used. The analysis of the AE signal is based on the Gutenberg–Richter law (GBR), which expresses the relationship between magnitude and total number of earthquake events in a defined region and time interval. On the basis of the GBR law the AE signals identifying critical damage are selected. Moreover, an analysis of the event frequency of these critical AE signals that satisfies the specific requirements of the GBR law permits the relationship between the AE signals and specimen stress to be identified. The proposed procedure is validated experimentally through compression tests carried out on cubic concrete specimens.

Keywords: Damage mechanics; Acoustic emission; Non-destructive testing; Process monitoring.

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