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### Abstract

Normal and recycled aggregate concrete differ significantly in their fracture characteristics. The cracking in recycled concrete initiates earlier; the fracture length is generally larger and the use of high proportion of recycled aggregate results in higher strain gradients in the fracture process zone. However, in spite of the negative influences, the mechanical responses of normal concrete and concrete with 30% recycled aggregate are similar to each other. This paper shows the influence of recycled aggregate proportion on the characteristics of fracture process. Furthermore, classification of the recorded acoustic signals during the fracture test was carried out; three clusters correspond respectively to aggregate fracture, cracking in cement mortar and cracking at the interfacial transition zone were discriminated. The evolution of each micro-fracture phase in terms of the mechanical state of the material was analyzed. A comparison of the apparition chronology of each cluster for normal concrete and recycled concrete was carried out.

**Keywords:** recycled aggregate; digital image correlation; acoustic emission; fracture; cluster analysis

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