

Cracking Damage Evaluation of Concrete by X-ray CT Images with Decision Tree Analysis

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The durability of concrete structures is affected by accumulation of cracking damage. It is essential to understand the spatial distribution of cracks inner the material. In this study, detection of concrete damage in concrete-core samples were conducted by X-ray CT images with decision tree analysis. The damage degree was evaluated by the AE energy parameter in compression field. The specimens were drill out from an agricultural infrastructure with frost damage, which was constructed 53 years ago. As a result, the estimation of concrete damage part was accurately identified by X-ray CT images with decision tree indexes. Image processing using decision tree analysis can accurately extract cracks in coarse aggregates and transition zones compared to conventional image processing. The concrete damage accumulation was a close relationship between X-ray CT characteristics and the AE energy parameters. The longer the void perimeter length, the more AE energy was detected at the beginning of loading. In particular, AE energy can be an effective index even for specimens whose internal crack damage could not be properly evaluated by compressive strength. Thus, the X-ray CT measurement is useful for visualization and quantification of accumulated concrete damage, and more detailed damage evaluation would be possible by using AE energy in core test.