

DAMAGE ASSESSMENT FOR CONCRETE-STRUCTURES USING AE/UT TECHNIQUE

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ABSTRACT

In the present study, damage processes of concrete specimens under load repeated are investigated by applying a scalar damage based on damage mechanics. In order to estimate the damage, acoustic emission (AE) and ultrasonic testing (UT) are applied for five stages of damage degree. The propagation-attenuation of elastic waves is discussed in regard with adequate components of frequency for evaluating microcracks. As shown in Figure 1 (left), the result of AE activity is in good agreement with the scalar damage up to the Stage IV. As approaching yield point, higher AE activity is observed, although obvious growth of scalar damage is not obtained. Applicability of AE technique for not only damage process but also fracture progress is thus confirmed. In UT technique as shown in Figure 1 (right), the increase of propagation-attenuation in the filtered waves is evident with the scalar damage during Stage II-IV. It is resulted that the damage degree could be evaluated by the attenuation of adequately filtered elastic waves. Since the scalar damage based on damage mechanics is physically correlated with the volume of microcracks, it is confirmed that the AE/UT technique would be a promising method to evaluate the initiation and growth of microcracks.

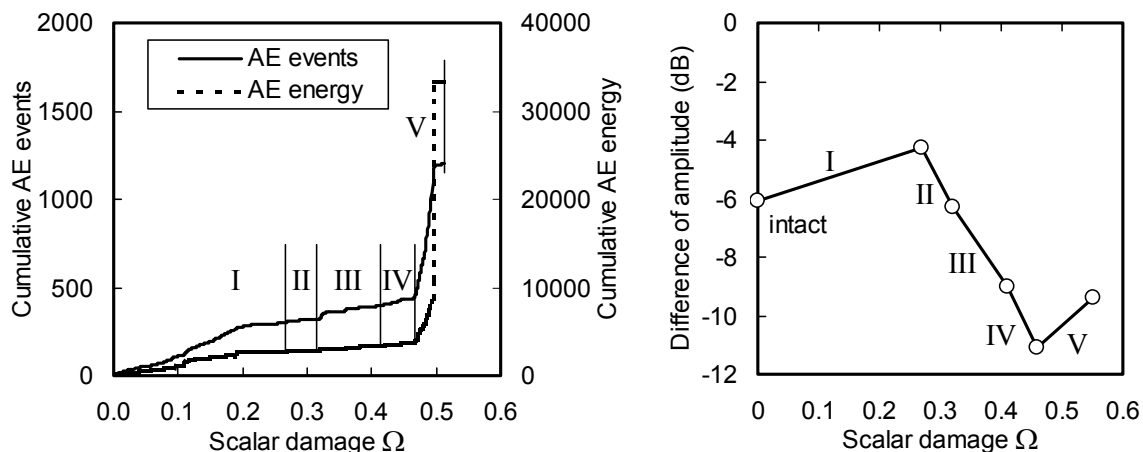


Figure 1: Results (left: relationship between scalar damage and cumulative AE parameters and right: relationship between scalar damage and attenuation of filtered waves)