

To Evaluate the Degradation of Heat Damaged Concrete Specimens after Curing Using Non-Linear Ultrasound Technique

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In this research, Non-linear Ultrasound (NLU) technique was used to approach the degradation of heat-damaged concrete composite with explicit non-linear properties. Normal concrete (NC) and low-activated high alumina concrete (HAC) were chosen as the test materials. The produced 5x5x5cm cubes and 5x5x2cm bricks of three water cement ratios, $w/c = 0.4, 0.5$ and 0.6 , were heated at different temperatures (30, 200, 300, 400, 600, 800°C) for 24 hours to create degraded specimens of different levels. After curing process in water for 28 days, mechanical property tests were carried out to indicate stress-strain relation and strength of the cube specimens. NLU were conducted on the brick specimens, which have to keep saturation during the test. In the NLU experiments, RITEC SNAP System with 250/500 kHz transmit/receive transducers was used to produce RF signal and conducted the measurement of harmonics. The obtained amplitudes of fundamental harmonic A1, 2nd harmonic A2 and 3rd harmonic A3 were analyzed to approach the non-linear parameters, β and γ , as the 2nd and 3rd order constants in stress-strain relation of material. This study also indicated that some adjusted values of $A3/A13$ and $A2/A12$ coordinating with the amplitude decrement of A1 can be used to quantify the extent of the degradation. The results showed a promised degradation quantification using NLU measurement. Extended application can be expected.