

Assessment of concrete compressive strength by ultrasonic pulse velocity test

Mohammed Hmood Mohanaa

*aCivil Engineering,
College of Engineering,
University of
Anbar,Ramadi, IRAQ*

ABSTRACT

One of the most popular non-destructive techniques is ultrasonic pulse velocity (UPV) which used in assessment of concrete properties. A statistical experimental program was carried out in the present study to establish an accurate relation between the UPV and the concrete compressive strength. The program involved testing of concrete cubes cast with specified test variables. The variables are the age and density of concrete. In this research, all the samples were tested by direct ultrasonic pulse velocity (DUPV) and surface ultrasonic pulse velocity (SUPV) to measure the wave velocity in concrete and the compressive strength for each sample. An experimental study was conducted to compare between the velocities of ultrasonic waves that transmitted along the two paths; direct and indirect. A total of more than 150 cubes having dimensions of 150 mm side were prepared to conduct both non-destructive and the compressive strength (destructive testing). The results from experimental program were used as input data in a statistical program (SPSS) to predict the best equation, which can represent the relation between the UPV (direct, indirect), and compressive strength, a linear equation is proposed for this purpose. The UPV measurement and compressive strength tests were carried out at the concrete age of 7, 28, 56 days. A relationship curves were drawn between DUPV, SUPV, compressive strength and density. The mixes composition in this study consists of ordinary Portland cement, fine sand, gravel, super-plasticizer, and water. All the specimens were under (20) C°. The statistical analysis revealed that the possibility in evaluating the properties of the concrete by using direct and indirect wave velocities