

## **Compressive Strength Evaluation of Underwater Concrete Structures Integrating the Combination of Rebound Hardness and Ultrasonic Pulse Velocity Methods with Artificial Neural Networks**

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**Abstract :** In this study, two kinds of nondestructive evaluation (NDE) techniques (rebound hardness and ultrasonic pulse velocity methods) are investigated for the effective maintenance of underwater concrete structures. A new methodology to estimate the underwater concrete strengths more effectively, named “artificial neural network (ANN) - based concrete strength estimation with the combination of rebound hardness and ultrasonic pulse velocity methods” is proposed and verified throughout a series of experimental works.

**Keywords :** underwater concrete, rebound hardness, Schmidt hammer, ultrasonic pulse velocity, ultrasonic sensor, artificial neural networks, ANN

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