

ANN PREDICTION OF MECHANICAL PROPERTIES OF GGBFS AND ALCCOFINE BASED HIGH STRENGTH SELF-COMPACTING CONCRETE

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Abstract. In this study, we use Artificial Neural Networks (ANN) and Multiple Regression Analysis to evaluate the prediction of two crucial self-compacting concrete properties: compressive strength and split tensile strength. It was possible to create four different datasets, each of which had different concrete mix proportions along with their respective ages in days, compressive strengths (MPa), and split tensile strengths (MPa). Separate ANN models and Regression models were trained and tested using these datasets. As a gauge of prediction accuracy, Mean Squared Error (MSE) was used to assess the performance of the models. This study offers insightful information on the application of multiple regression analysis and artificial neural networks to forecast the characteristics of self-compacting concrete using GGBFS and Alccofine. Here Alccofine functions as an additive and GGBFS acts as a partial substitute for cement at 0 to 60% with a fluctuation of 10%. The outcomes highlight the potential of neural networks as a tool for concrete mix design optimization and quality control since they can capture complex correlations between input variables and concrete strength.

Keywords: Self Compacting Concrete (SCC), Compressive strength (CS), Split tensile strength (S.T.S), Artificial Neural Network (ANN), Multiple Regression Analysis (MRA), Mean squared error (MSE).

1. Introduction

The quality, strength, and longevity of concrete constructions are continually being sought by the construction industry. Self-compacting concrete (SCC) has gained popularity as a prospective alternative because it has several benefits, such as greater flowability, lower labor demands, and improved structural performance. Construction methods have been revolutionized by SCC, which can self-level and compact under its weight without the need for external consolidation. As a result, it is now widely used in many different technical applications. New concrete that self-compacts (SCC) flows under its weight without the assistance of external vibration. When employing vibrators to consolidate concrete proves to be challenging, this method is utilized in construction. SCC can fill and travel through things and resist segregation, among other properties. SCC has exceptional flow qualities in its fresh condition, enabling self-compaction and material consolidation without segregation issues. Better flow characteristics of fresh SCC enable material consolidation and self-compaction without segregation problems. A form of computer model known as an artificial neural network (ANN) comprises several processing components that accept inputs and produce results by pre-established activation functions. Artificial neurons, which are a group of interconnected nodes or units that roughly mimic the neurons in a human brain, are the



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SAP2000 Software Analysis and Design of the Intze Water Tank



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1 Introduction

A water tank is used for keeping enough water to last all day. Water is correctly preserved in a suitable amount in societies that are civilized. An essential part of modern city and town development is water tanks. Therefore, it is crucial that water tanks be constructed with the utmost consideration for their structural integrity and safety. The ability of concrete to withstand liquids is crucial for building structures out of concrete to store water and other liquids. Any homogenous, properly compacted concrete with specific mix proportions will have a permeability that is mostly reliant on the water-cement ratio. To prevent structural cracks, the right choice of water-cement ratio is essential. Any elevated water tank consists of two parts. Namely,

- Dome or frustum that stores the water.
- Staging system required to take the water storage to a desirable elevation.

The area of the dome that will be in contact with water typically consists of walls made of reinforced concrete. Vertical columns and intermediate beams are two possible components of the staging system. In some water tanks, the staging system is composed of a conical or tubular single reinforced concrete wall column. The seismic design consideration is essential in storage tanks [1, 2].

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K. S. Sreekesava et al. (eds.), *Recent Advances in Structural Engineering*, Lecture Notes in Civil Engineering 455, https://doi.org/10.1007/978-981-99-9502-8_7

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