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An Analytical Research on Synergistic Effects of Copper Slag and Rice Husk Ash in Geopolymer Concrete

Indarpal Singh Dhariwal[1] and Raushan Kumar[2]
Research Scholar, Department of Civil Engineering[1]
Assistant Professor, Department of Computer Science and Engineering[2]
Eklavya University, Damoh M.P, India

Abstract: *This study investigated the possibility of fly ash (FA) and rice husk ash (RHA) as supplemental cementitious materials for partially substituting cement in the manufacturing of concrete, with the aim of lowering the CO_2 associated with the cement industry. The purpose of the study was to examine the combined impact on the fresh, hardened, non-destructive, and microscopic properties of concrete of a cement-based mixture including RHA and FA in varying amounts. Together with the experimental work, this study effectively used three different types of algorithms ANN (Analytical Neural Network), XGB (Extreme Gradient Boosting), and GBM (Gradient Boosting Model) to apply machine learning to forecast the compressive strength of RHA-FA concrete. Environmental conservation is currently a goal that everyone aspires to accomplish. Sustainable development compliant alternative material advancements have been affected by the building sector. In this article, 20% fly ash and 80% blast furnace slag were combined to create reinforced concrete. Because they offer the lowest porosity in the cementitious matrix, these concentrations were selected. The activator was rice husk ash. Fibres from Guadua angustifolia were utilised to assess the concrete's mechanical performance. X-ray fluorescence was utilised to ascertain the raw materials composition, AFM was used to ascertain the fibres' microstructure, and SEM was employed to ascertain the surface properties of guadua fibres and concrete mixtures.*

Keywords: Synergistic Effects, Copper Slag, Rice Husk Ash, Geopolymer Concrete, CO_2, XGB