

Modification of Geopolymer-Based Flowable Fill Using Rice Husk Ash

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ABSTRACT

Conventional flowable fill is commonly used for backfilling in geotechnical engineering. This study presents the flow behavior and strength characteristics of geopolymer-based flowable fill modified with rice husk ash. The physical and chemical properties of rice husk ash and fly ash are analyzed using laser diffraction, X-ray fluorescence, and X-ray diffraction. An alkaline solution is prepared by mixing sodium silicate and sodium hydroxide for the geopolymer matrix. Three different ratios of rice husk ash to fly ash are used in the mixtures, with the proportions of sand, alkaline solution, and water maintained consistently across all mixtures. Specimens are cured for 3, 7, and 28 days to monitor strength development. Flowability and strength characteristics of the mixtures are assessed through flow tests, unconfined compression tests, and splitting tensile tests. Experimental results demonstrate that incorporating 10 % rice husk ash, relative to the fly ash content, significantly enhances the flowability and strength of geopolymer-based flowable fill. Among the tested mixtures, the specimens with the rice husk ash content of 10 % show the highest compressive and tensile strength. These findings demonstrate the potential of rice husk ash, an agricultural byproduct, as a sustainable alternative material for backfill applications.

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The 2025 World Congress on
Advances in Structural Engineering and Mechanics (ASEM25)
BEXCO, Busan, Korea, August 11-14, 2025

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