Numerical Investigation of Reinforced Concrete Beam Containing Iron Ore Tailings as Partial Replacement of Sand

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ABSTRACT

The production of industrial and agricultural residual by-products can generate significant environmental impact. In response, researchers have begun incorporating supplementary materials made from agro-industrial wastes to create more sustainable concrete. However, testing the performance of these waste-based concrete mixtures can be time-consuming and expensive. To address this issue, this study utilized three-dimensional non-linear Finite Element simulation using the ABAQUS/CAE software to predict the behavior of a reinforced concrete beam that incorporated 20% IOT as partial sand replacement. The simulation successfully predicted the damage behavior of the 20% IOT concrete, indicating the potential of this modeling approach to accurately predict the performance of waste-based concrete mixtures in various designs.

Keywords*: ABAQUS; Iron Ore Tailings; Reinforced Concrete Beam, Numerical Analysis.*