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Impact Resistance and Strength Development of Fly Ash Based Self-compacting Concrete

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Abstract

The development of self-compacting concrete using alternative materials is expanding in recent years due to the technical and economic benefits of the mixture. This study focuses on the structural and compositional behavior of sodium hydroxide (NaOH)-activated fly ash based self-compacting concrete (SCC). Fly ash was partially replaced with Ordinary Portland Cement from 0–30%. The tests performed on concrete samples include workability, strength, microstructural, and impact resistance. The results showed that activated fly ash reduces the heat of the hydration process of the concrete mixture but enhances pozzolanic reactions, which led to increased strength properties. The addition of activated fly ash modifies the mineralogy of the concrete, as evident in strength characteristics. The best performance of the activated fly ash based SCC, in terms of strength, was found at 10–15% substitutions, which can somewhat reduce the cost of production of SCC and strength improvement advantage.

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Data Availability

Data used in this study will be made available upon request.

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Contributions

All authors whose names appear on the submission made substantial contributions to the conception, design of the work, acquisition, analysis, interpretation of data and writing/revision of the article.

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Ethics declarations

Conflict of Interest

The authors declare that there is no conflict of interest.

Consent to Participate

Not applicable.

Consent for Publication

Not applicable.

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