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Ultra-lightweight eps concrete: Mixing procedure and predictive models for compressive strength (Article) (Open Access)

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Abstract

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Expanded polystyrene (EPS) lightweight concrete is increasingly used in various applications due to its lightweight, excellent heat preservation, sound insulation and energy absorbing characteristics. However, due to the hydrophobic nature and very low density of EPS beads, EPS concretes are prone to segregation, poor bonding, and homogeneity issues. The properties of EPS concrete are highly dependent on the mixture proportions and mixing procedure. This study involves the development of a quality mixing procedure for Ultra-lightweight EPS concrete and the development of two predictive compressive strength models function of concrete mixture and density, respectively. An experimental program is developed to implement the mixing procedure and to calibrate and evaluate the accuracy of the models. The proposed models were found to accurately predict the strength of concrete mixtures. The corresponding standard error for the models is less than 0.3 MPa and the corresponding correlation coefficient is greater than 0.93. To ensure quality control before concrete is cast, a link between the plastic density of fresh concrete and the compressive strength was established. Furthermore, to accommodate tight construction schedules, the effects of concrete age on the compressive strength development were studied and the 28-day strength was related to strengths at early ages. © 2020 by authors, all rights reserved.

SciVal Topic Prominence ⓘ

Topic: Concrete Aggregates | Pumice | Self Compacting Concrete

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Author keywords

Compressive Strength Density EPS Concrete Expanded Polystyrene Foamed Concrete Lightweight Concrete
Mixing Procedure Mixture Proportioning

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