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Data Article

Experimental data on the properties of polymer-modified cement grouts using epoxy and acrylic resin emulsions

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ABSTRACT

The use of additives to improve the quality of cement grouts is crucial for civil engineering, especially in foundation construction. This article presents experimental data concerning the compressive strength, elastic modulus, bleeding and injectability of microfine cement grouts modified with epoxy and acrylic resin emulsions. Strength properties were obtained at different curing ages. For further analysis and detailed discussion of properties of polymer-modified cement grouts, see "Fundamental properties of epoxy resin-modified cement grouts" (C.A. Anagnostopoulos, G. Sapidis, E. Papastergiadis, 2016) [1].

Specifications Table

Subject area	*Materials*
More specific subject area	*Polymer modified cement grouts.*
Type of data	*Tables, figures.*

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How data was acquired	*Laboratory tests and collection.*
Data format	*Raw, calculated, analyzed, tabulated, plotted.*
Experimental factors	*The specimens of un-modified and polymer- modified cement grouts (PMGs) were prepared and treated as described in [1].*
Experimental features	*Testing the compressive strength and elastic modulus of PMGs with different epoxy and acrylic resin content at designed curing ages in laboratory condition. Rheological measurements were taken from injection tests on soil columns.*
Data source location	*Faculty of Civil Engineering in Thessaloniki, Greece.*
Data accessibility	*Data is with the article.*

Value of the data

- This data can be useful for comparing some properties of PMGs with that of ordinary grouts.
- The data highlights the influence of different polymer additives on some properties of cement grouts.
- This article will serve a as guideline to select parameters of PMGs in the development of further research (for instance: type of cement, epoxy resin content, curing time, combination with other additives).

1. Data

Composition of the tested grouts (Table 1) and data concerning their strength (Table 2), rheological parameters (Table 3 and Fig. 2) and bleeding (Table 4), collected from authors' experiments, are presented.

2. Experimental design, materials and methods

2.1. Materials

The experiments were carried out using a common type of Portland cement (CEM I 52.5 N). A polycarboxylate ether-type (PCE) high range water reducer was used as superplasticiser [2]. Epoxy and acrylic resin emulsions were used as polymer additives. Acrylic resin (AR) is an emulsion of methyl methacrylate-acrylic acid copolymer. Epoxy resin (ER) is water soluble and composed of two components: epoxy resin based on diglycidyl ether of bisphenol-A and an aliphatic amine-based hardener.

2.2. Methods

Grouts were prepared with w/c ratios of 0.5, 0.4 and 0.33. The superplasticiser dosage (by cement mass) for the various grouts corresponded to the saturation dosage [3]. The design details of mixtures are presented in Table 1.

Mixing of the grouts was accomplished using a high rotating mixer recommended in ASTM C938-10. In the case of ER-modified grouts, initially, appropriate amounts of cement, water and superplasticiser were thoroughly mixed for 5 min. Afterwards, the required amount of ER, whose two components were mixed in a separate container, was added to the grout, and the resulting mixture was blended for a few minutes to achieve a uniform mixture. Conversely, the preparation of AR-modified grouts was performed by simultaneously mixing cement, water, superplasticiser and acrylic latex.

Bleeding was measured by conducting sedimentation tests according to ASTM C940-10.