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OPTIMIZATION OF GLASS FIBERS USED AS DISPERSE REINFORCEMENT OF EPOXY POLYMER CONCRETE WITH FLY ASH

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Abstract

Construction industry uses a huge quantity of traditional and modern building materials which generally are produced to satisfy different demands, such as: resistant and safety requirements, friendly with the environment, architectural aspects etc. Researches must solve any requirements related to materials properties and offer a large diversity from which the proper solution must be considered. For improving the mechanical properties of polymer concrete, the use of fibers of different types is a possibility that had been studied in the last decades.

In the article, epoxy resin, fly ash and two sorts of river aggregates in a constant dosage were used in preparing experimental samples. Glass fiber waste was added in different dosages and lengths. Compressive strength, flexural strength and split tensile strength were experimentally determined. The bigger lengths and dosages of glass fiber determined high mechanical properties.

In order to optimize the process, a regression analysis was applied for model determination and, after that, a self-adaptive Differential Evolution (DE) based approach was employed to determine the specific conditions that lead to a maximization of compressive strength (f_c), flexural strength (f_{fi}) and tensile strength (f_{td}).

The results obtained by simulation were accordingly to experimental results, the higher strengths being obtained for high fiber dosages.

Key words: evolutionary algorithms, mechanical properties, optimization, polymer concrete, regression analysis

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