

Application of Taguchi method for mechanical properties of concrete containing fibers

Hamid Eskandari-Naddaf^{1*}, Mahsa Zarehparvar-Shoja²

1. Associate Professor, Civil Engineering Department, Hakim Sabzevari University, Sabzevar, Iran,
Hamidsttu@yahoo.com
2. Tech Student, Department of Civil Engineering, Hakim Sabzevari University, Sabzevar, Iran,
Mahsa.zarehparvar@gmail.com

Abstract

Compressive strength is one of the most important characteristics of concrete for the classification of concrete in international regulations. The present study investigates the effect of fibers with different percentages on concrete cubic samples. Studies in this field indicate improvement of concrete properties and higher strength by adding fibers. In this regard, 12 mixing designs with different amounts of these additives with three types of cement strength classes (525, 425, 325) and 36 cubic samples (10 * 10 * 10) were designed and tested to measure compressive strength, of which only 6 design have used the mixing plan in the research. The purpose of this study is to present a new method for concrete mix design using optimization principles. In this study, self-compacting concrete mix design was optimized using the Taguchi method for compressive strength. To this aim, the optimization model for the concrete mix design is defined as the effect of the experimental results. Optimization of mixing ratios Due to the fact that concrete contains several main components and often has several constraints, it is difficult and time consuming. Statistical empirical design and analytical methods to optimize the design of mixing products such as concrete whose ultimate strength properties depend on the relative amount of their components can be a very suitable method. Therefore, in this paper, with the help of Taguchi statistical methods, the optimal mixing plan for this type of concrete was determined and this method, by reducing the number of experiments, predicts the optimal composition of the materials. The results obtained from MINITAB software show that the fiber at 18 grams in cement class of 42.5 MPa has more compressive strength.

Key words: compressive strength, fibers, taguchi method, types of compressive strength class of cement

1. Introduction

In order to produce a concrete with a specific compressive strength, various factors such as the rate of application of the compound and its related additives, as well as the amount and