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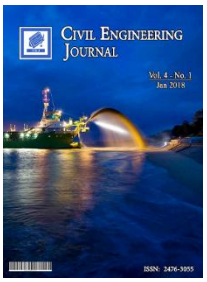

Use of Fillers for Optimal Formulation of Self-Compacting Concretes

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Abstract

The objective of this study is to achieve an optimal formulation of self-compacting concrete using local materials from the country of Morocco, the use of this type of concrete remains very limited compared to a concrete vibrated in this country, due to lack mastery by companies. We will therefore try to study an optimal formulation that respects European standards and gives comparable results, even improved, to those of vibrated concrete, in order to be able to replace vibrated concrete with self-compacting concrete in construction sites. Thus, SCC mixtures containing amounts of fillers were examined, and with different Portland cement dosages: 350; 375 and 400 kg/m^3. The method of formulation is made in accordance with French regulations. The results obtained were compared to these vibrated concrete counterparts containing the same cement dosages. Tests include compression, traction and flexion tests at 3, 7 and 28 days of age. Several studies have been carried out internationally, but at the national level, there is no study to this effect. The results obtained show that there is an improvement in the strength of concrete, in addition to the liquid appearance of concrete. It is this last aspect that characterizes the SCC, which allows it a flow in the areas inaccessible by the vibrator, thus saving time and performance of the structure to achieve.

Keywords: Self-Compacting Concrete; Formuation; Fillers; Resistance.

1. Introduction

Self-consolidating concretes (SCCs), which have been developed over the past three decades by Japanese researchers [1], are still referred to as "new concretes" because their use remains modest, although they have a high potential for development. The specificity of SCC compared to traditional concretes lies in the fact that they are extremely fluid and don't require vibration to be implemented. Compacting under their own weight, they can be cast in very scrapped areas or in areas of complex architecture and difficult to access [2].Their origin seems to stem from the need to use materials that are more and more "efficient" to offset a reduction in the quality of constructions due to a bad Placement of the material [3]. The use of a traditional concrete requires a vibration phase in order to properly fill the formwork. This step determines the quality of the final structure, but it is also a laborious task that requires special know-how. The solution proposed was to use a very fluid material capable of compacting under its own weight without external vibration. One of the main advantages of the SCC is that it allows the production of high-quality facings; also, it has an excellent deformability and high resistance to segregation [4-5]. SCCs are formulated differently from ordinary concretes: they contain less gravel, more fine elements and fluidifiers. This is of course what gives them an auto-compacting character. However, it is also likely that these results in a different mechanical behavior compared to ordinary concretes.

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