The Flextural behaviour of self compacting reinforcement slab incorporating fibre.

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Abstract

This project presents the details of the flexural behavior of self-compacting concrete (SCC) ferrocement fiber reinforced slab panels. A total of 30 slabs have been casted & tested under flexural loading. The size of the slab is 700 mm (length) x 150 mm (width) x 50mm (thickness). The parameters studied in this investigation include the fiber content, number of weld mesh layers. Test procedures for self compacting (SCC) have been explained in brief and all the tests have been performed. From the studies, it is observed that the load carrying capacities, energy absorption, deformation at ultimate load are high in the case ferrocement slab panel in steel fibers. Further, it is observed that there is reduction in crack width by using the steel fibers and as the fibers content increase the crack width decreases and numbers of crack also decreases indicates delay in crack growth.

Keywords: Self compacting concrete, ferrocement slab, fibers.

Introduction:

Concrete generally leads to poor material quality due to in-sufficient vibration or consolidation that eventually deteriorates the durability of concrete structures. Hence, the need for high workability of self-compatibility of concrete has been recognized as a means to improve the quality and reliability of constructed facilities. One of the solutions for the achievement of durable concrete structures is the use of self-compacting concrete (SCC), which can be compacted into every corner of a formwork, purely by means of its own weight and without the need for vibrating compaction. Concrete that must not be vibrated is a great challenge to the construction sector. In order to achieve such behavior, the fresh concrete must show both high fluidity and good cohesiveness at the same time (Corinaldesi and Marconi, 2004). Due to the heterogeneous structure of concrete, it results some undesirable effects such as many internal stress concentration zones, leading to internal micro-cracks. Under the application of externally imposed structural loads and environmental effects, concentration of tensile stresses occurs at the interfaces between aggregates and matrix, causing the growth of micro-cracks in size and number; propagation of interface micro-cracks into matrix and eventual joining of micro cracks eyield large cracks and lead to failure of concrete. Nowadays it is well known that the benefits of adding fibers to concrete, mainly the improvements in the residual load bearing capacity, are influenced by the type, content and orientation of the fibers. Fibers are added not to improve the tensile strength itself, but mainly to control the cracking, prevent coalescence of cracks, and to change the behavior of the material by bridging of fibers across the cracks. The properties of fibers that are usually of interest are fiber concentration, fiber geometry, fiber orientation, and fiberdistribution.

Literature Review:

Okamura, H., Ouchi.M. (2003), "Self-compacting concrete", J Adv Concr Technol:- As he presented the paper on self compacting concrete is a standard concrete and very useful as, Self-compacting concrete was first developed in 1988 to achieve durable concrete structures. Since then, various investigations have been carried out and this type of concrete has been used in practical structures in Japan, mainly by large construction companies. Investigations for establishing a rational mix-design method and self-compact ability testing methods have been carried out from the viewpoint of making self-compacting concrete a standard concrete.

Abdulkadir Cuneyt Aydin. (2007), "Self-compactability of high volume hybrid fiber reinforced concrete", Construction and Building Materials:-

According to Abdulkadir Cuneyt Aydin, self compacting concrete (SCC) offers several economical and technical benefits; the use of fibers extends its possibilities. SCC is a relatively new type of concrete with high flowability and cohesiveness when compared to conventional concrete. In this article carbon and steel fibers were used in combination, and the effects of fiber inclusion on the computability of hybrid fiber reinforced concrete are studied. The effects of fibers are quantified based on the fiber volume and type of the fibers. It was concluded that in addition to the above-mentioned quantifiable properties, other properties of fibers such as strain sensing, shape, and surface roughness are also found to be important but they cannot be quantified at this stage.

Methodology: following methods for self compacting concrete

1) Without using fibre
2) by using fibre

Project Development: The self compacting concrete which reduces our work, but there is chances of internal cracking. So to avoid this internal cracking use modern techniques such as self compaction by using fibre, Which reduces internal cracks.

Conclusion:

Flexural tests have been carried out on SCC ferrocement fiber reinforced slab panels. A total of 30 slabs have been tested under flexural loading. The size of the slab is 700 mm (length) x 300 mm (width) x 25 mm and 30 mm (thickness). The parameters studied in this investigation include the fiber content, no. of weld mesh layers thickness of ferrocement slabs. A test procedure for self compacting (SCC) has been explained in brief and all the tests have been performed. Flexural tests have been conducted on all the slabs by varying the parameters. From the studies, it is observed that the load carrying capacities, energy absorption, deformation at ultimate load are high in the case of SCC ferrocement steel hooked fibers. Further, it is observed that there is reduction in crack width and increase in number of cracks in the case of SCC ferrocement hybrid polypropylene fibers indicates delay in crack growth. These tests will be useful for damage tolerant design of SCC ferrocement structural components subjected to variety of loadings.