"LITERATURE SURVEY ON EFFECTS AND IMPACT OF VARIOUS FIBERS ON PROPERTIES OF CONCRETE"

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ABSTRACT

This paper provides a review of the large high-performance fly ash concrete reinforced with hybrid fibers. It is of course known wherein the production of the absorption per 1 ton 4GJ energy ordinary Portland cement (OPC), and generates about 750kg of CO2 and 1000 kg on aerosphere lead affect the ozone layer, global warming. Researchers have tried to replace the lead of cement fly ash to reduce the general strength. In general, fibers are mainly in order to enhance the matrix and increase the stronger concrete shrinkage crack resistance, it has been used in recent years. Some research or experimental work is reported in the literature, but more research is necessary for high-performance mechanical durability characteristics of high capacity hybrid fiber reinforced fly ash concrete. This paper investigated the provision of three different fibers; Individual and steel, polypropylene and basalt to form a hybrid. Analysis shows that the performance improvement can be obtained by using the fiber of the hybrid type.

Keyword *: high performance, high volume flyash concrete, steel fiber, polypropylene fiber, basalt fiber, hybrid fibers, high volume flyash concrete.*

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1. INTRODUCTION

Concrete in general and high performance concrete in particular is quasi brittle. Flyash in Ordinary Portland Cement concrete, it is normally accepted that the lime liberated by the hydrating cement reacts with the finely splitted silica in the flyash to the formation of C-S-H gel with the advantages of concrete workability, reduction in the water demand in concrete.

Fly ash as well as improving the mechanical properties of the concrete and, such pozzolanic material 1 is used as a supplementary cementitious material to reduce the cement concrete consumption by replacing part of the cement. As a concrete mixture increasing cement content, hydration product as thus will be fly ash increases the amount of CA (OH) 2 which is input to increase the reaction, and the cause of the next increase in the amount of CSH, therefore use the fly ash more efficiently as well as both the binder serves fresh hardened concrete [2]. By a matrix with or after cracking by improving the stiffness of the fibers Thomas be held by both of these mechanisms, or a combination of it said strengthening the matrix.

The concept of high-performance concrete was formulated in the early 80 '

Japanese scientists have won this until 500 years can be expected lifetime of the HPC. Mass stability, high wear resistance, high chemical resistance, high strength, low water absorption, high durability, workability are normal features of high performance concrete [4]. High-performance fiber-reinforced cement composite are higher gain is to increase the strength of the concrete is more sensitive to deformation than the normal charge rate compared to the conventional concrete.

Mechanical behavior of fly ash high performance concrete reinforced steel fibers is significantly improved. Failure mode is to change the concrete ductile brittle that the addition of steel fibers considerably. Strain rate has a significant effect on concrete strength and toughness energy in proportion to the compression fiber content in both the static and dynamic. The addition of polypropylene fibers for high-performance concrete is one way to prevent the concrete from the polling fire conditions. Super plasticizers are used to achieve high-performance, high-volume ultra-fine fly ash concrete workability using chemical admixtures. Nowadays, Researchers use steel fibers, polypropylene fibers and basalt fibers in concrete as it improves the strength in concrete. In order to contribute to a reduction of use of cement worldwide, industry wastages like flyash have been initiated by researchers to replace OPC in the concrete, so it is proposed that the flyash could be a potential replacement for ordinary portland cement producing high volume flyash concrete with the use of steel fibers, polypropylene fibers and basalt fibers in hybrid form in order to improve the ultimate strength characteristics of hybrid fiber reinforced high performance high volume flyash concrete.

A. Fibers in Concrete

To make the concrete ductile, different kinds of fibers may be used as secondary reinforcement. As the concrete is weak in tension, to inhibit crack initiation and propagation and to increase the tensile strength and ductility of concrete, fibers are used in concrete.

B. Hybrid Fiber Reinforced Concrete (HFRC)

It is a type of fiber reinforced concrete characterized by its composition and also known to the interaction and/or co-operation of the two or more fibers that acts as a secondary reinforcement in the concrete in which synergy effect is implemented to produce a combined effect.

The following section present the review of fibers, flyash used in the concrete.

3. REVIEW OF LITERATURE

A. Characteristics of High Volume Flyash Concrete:

Class F fly ash may replace 50% of the portland cement and could result in improving resistance to chloride initiated corrosion but such replacement however, may significantly reduce the values of the mechanical properties, such concrete is considered a high performance concrete.

As for the strength and durability in addition to the weight suitable for concrete structures to hydration low cement content, low heat until the bulk fly ash concrete has favorable results have considerable potential for use a conventional Portland cement content were produced in with the concrete application and the fly ash of a large class F. 80% of the Class F fly ash by using the appropriate reasonable mixing ratio can be used in concrete, cement substitute. Compression and bending strength of the high volume fly ash concrete mixtures showed a persistent and significant improvement in the late age of 91 365 days.

The use of Class F fly ash as a partial substitute for the mass concrete, cement reduced the abrasion resistance of the compressive strength, splitting tensile strength and flexural strength, elastic modulus, concrete. Low temperature rise in the concrete can be caused due to a medium and high strength and low reduction in the temperature rise and the maximum temperature rise in the high-performance concrete prepared using the fly ash replaces the cement mass increase the excess level of the fly ash.

Improvement is usually important achievement of improved performance, durability and mechanical properties through the use of fly ash in cement concrete replacement parts compared to the strength of Portland cement concrete.

B. Effect of Fibers in Ordinary Portland Cement Concrete

Fibers can be disruptive to a brittle concrete composite that are of high modulus and relatively stiff [15]. Fiber reinforcement increases the onset of flexural cracking and increasing the post-cracking properties of ductility, tensile strain capability and energy absorption capacity.

C. Effect of Steel Fiber in High Performance Concrete

Behaviors of high performance steel fiber reinforced concrete to resist impact was much better than that of reinforced high strength concrete. Addition of crimped steel-fibers to concrete increases the toughness considerably and lead to slight decrease in the compressive strength of concrete.

The equivalent bond strength of straight steel fibers, which are commonly used in ultra-high performance fiber reinforced concrete, can be doubled by optimizing the ultra-high performance concrete matrix through composition and particle size distribution, leading to typical pullout load slip hardening behavior which is desirable for high tensile strength, high energy absorbing and strain hardening of concrete.

The steel fiber which has the ability to bond well throughout the concrete and can withstand more stiffness.

D. Effect of Polypropylene Fiber in the Concrete

Poly addition of the propylene fibers increased significantly fly ash, the durability of the composite concrete comprising the silica fume, however, fly ash, and has a small adverse effect on the workability of the composite concrete containing silica fume. Additional water permeability, depth of carbonation shrinkage deformation and fly ash, concrete containing silica fume is gradually reduced with the increase in the fiber volume fraction.

Being a member of a polymer fiber, polypropylene fiber reinforced because of shrinkage cracking resistance, low cost and concrete win the most recognized among academic researchers and experimenters excellent toughness. Poly improve the fracture toughness of the polypropylene fiber, and the concrete has been observed that there is no bending toughness and the impact resistance was increased in the presence of concrete Polypropylene fiber compression or significant effects on the flexural strength of the concrete. Specific synthesis uniformly distributed large number of polypropylene fiber of the fresh concrete mixture may form a lattice structure supported the effect on the aggregate reduced bleeding separation.

The durability of concrete off mainly due to the mechanical characteristics of the disorder, such as concrete durability failure is the most important attribute. In the initial stage of concrete cracks, and passes through the micro-cracks in concrete and expansion of the polypropylene fiber. Tensile stress is to disassemble the structure, the stress can be performed. It may be bound to spread, and thus has a high Young's modulus polypropylene fiber. The macro cracks can be improved remarkably and the tensile strength.

E. effects of the individual fibers of high volume fly ash concrete

Kayali is the fiber mass of fly ash concrete compressive strength achieved more than double that of concrete without fly ash were found, including reinforced concrete tensile strength. Because fiber steel fiber matrix (29) to achieve a fine modifications and improvements to above 100% which is estimated to have improved gomildohwayi at the transition area between the polypropylene and the maximum gain of the resulting fiber to 50%.

The use of fly ash and lime water is used in the ultra-fine particles is an important factor for each increase in the compressive strength of the fly ash concrete mass. In addition, to reduce the compressive strength of the alkaline environment and the lower concrete volume stability due to the use of basalt fibers.

F. Effect of Basalt Fiber in the Concrete

The addition of basalt fiber can significantly improve deformation and energy absorption properties, while there is no notable enhancement in dynamic compressive strength. Addition of basalt fibers up to 2% fiber volume together with mineral admixtures improved the compressive strength and the improvement in the strains corresponding to maximum compressive strength. The basalt fiber significantly improves the tensile strength, flexural strength and toughness index, whereas the compressive strength shows no obvious increase.

Nihat stated that degradation of basalt fiber in concrete can be found under microstructure analysis showing that basalt fiber changes into small parts which are different from its original form. Steel fiber is better as a strengthening material in high volume flyash concrete but the addition of basalt fiber resulted in decrease in compressive strength as the fracture energy and flexural strength on the other hand improved with the addition of basalt fiber. As the basalt fiber content increased, the concretes showed higher ultimate loads, larger deflections before failure and higher fracture energy values.

The basalt fiber strengthening improved both the yielding and the ultimate strength up to 27% and the basalt fiber strengthening will be a good alternative methodology among other fiber reinforced polymer strengthening systems and these fibers are more efficient in strengthening and toughening the geo-polymeric concretes than ordinary portland cement concretes only for higher fiber concentrations and this difference in behavior is probably related to the nature of the bond between fiber and matrix. So the basalt fiber can improve the energy absorption properties, toughness index and flexural strength in the concrete.

G. Effect of Polypropylene Fiber and Flyash in the Concrete

A certain content of fine particles such as fly ash is necessary to evenly disperse the hybrid fibers containing polypropylene fibers. The micromechanical feature of crack bridging is operative from early stages of damage evolution to beyond ultimate loading .

Presence of fly ash and polypropylene fiber in concrete regardless of separately or together reduces drying shrinkage. The influence of polypropylene fiber in flyash concrete is found to be insignificant on compressive strength. Polypropylene fiber decreases the workability of the concrete but, polypropylene fiber addition, either into portland cement concrete or fly ash concrete, did not improve the compressive strength but the positive interactions between polypropylene fibers and fly ash lead to the lowest drying shrinkage of fibrous concrete with fly ash as it increased the freeze–thaw resistance more than only the polypropylene fibers did.

H. Effect of Hybrid Fibers in the Concrete

Cement-based composites can be produced using a mixture of organic and inorganic fibres which exhibit the advantages of both. The high impact strength derived from nylon and polypropylene will remain stable over very long periods of time in normal use. Improved behavior in bending may be obtainable with organic fibres by improving the stress transfer to the fibres and by using higher volume fractions.

Hybrid fibres are to control cracks at different size levels, in different zones of concrete at different curing ages and at different loading stages. The large and the strong fibres control large cracks. The small and soft fibres control crack initiation and propagation of small cracks.

The performance under impact loads in hybrid fiber reinforced concrete in which polypropylene fiber was more effective than glass fiber in the hybrid fiber reinforced concrete. Hybrid combination of steel fiber and polypropylene fiber enhances the resistance to both nucleation and growth of cracks, and that such fundamental fracture tests are very useful in developing high performance hybrid fiber composites .

The presence of hybrid fibers in the concrete can resist tensile stress in the tensile zone below the neutral axis as it incorporates more destructive energy in the hybrid fiber-reinforced concrete, as it has more amount of the fiber content in it.

4. CONCLUSIONS AND DISCUSSIONS

Strong and rigid is steel fiber (high modulus fibers), from the above-mentioned literature review of improving concrete strength, have the ability to enhance the clear polypropylene fibers (low elastic modulus fiber), the brittle cementitious material, improved in the crack part after while more flexible maintaining the heat, deformability for an extended period of time through to toughness and has a property to delay the premature cracking. Oxidizing radiation resistance, fracture energy, high wear resistance, basalt fiber bending strength increases lead.

Therefore, in a hybrid form in consideration of the advantages of the individual steel fibers, polypropylene fibers and basalt fiber, present volume of a hybrid fiber combination of three fiber with high performance that is offered by the system (steel fibers, polypropylene fibers and basalt fiber) fly ash concrete has can improve the micromechanical properties, deformability and can increase the load capacity, it can hold increased compressive strength, splitting tensile strength, with the toughness properties of the three since the concrete exhibit excellent mechanical properties including the flexural strength initial the cracks in the bridge stage, it can improve the carrying capacity of the structure and structural stiffness, impact, can improve the fatigue strength and wear.

The high volume fraction in order to improve the mechanical properties of the composite fibers, that is proportional to, but larger than 2%, suggests that may affect the workability of the concrete.

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