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The Contribution of Metal Fibers In The Improvement of Mechanical Concrete Classic Features

(Experimental Study of The Behavior of The Material (Bfm) Under Stress Mechanical)

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ABSTRACT:

Our Works deals with the experimental study of a comparative study of a first metal fiber concrete and conventional concrete concerning the compression and a concrete fiber reinforced concrete compared to shear (effect calipers).

This aims to improve the performance of this material remains a fragile tractive effort. Therefore, with the addition of metal fibers, it can change the mechanical behavior: stiff ductile.

But this behavior change provides many opportunities for using this composite of architectural and structural points of view than conventional concrete can not ensure that it always remains fragile vis-à-vis the traction efforts.

Keywords: *Composite, mechanical behavior, concrete, metal fibers, compression, and shear.*

I. INTRODUCTION

The concrete remains a modern material, but with that low tensile strength, fragility, and ability to make micro-cracking need to be strengthened in most applications.
So using frames, cables or son of prestressed.

These traditional solutions are proven, and they will remain employed much longer. There is another solution to drown in the concrete of the resistance elements in tension, called metal fibers. This leads to a composite material. The precise knowledge of the mechanical behavior at the global scale of this material is essential to describing his behavior and modeling.

This work's contribution was to explore particularly the results of the compression tests and shear of reinforced concrete to compare it to conventional concrete and reinforced concrete to see the effect of transverse reinforcement (stirrups).

Recall that reinforced concrete's mechanical properties depend on many parameters, including the implementation of conditions and parameters related to fibers and their orientation (effect of anisotropy).

Therefore, with such behavior, the use of this material in the design of some structural elements or within a framework of rehabilitation and reinforcement of old buildings is claimed.

II. Composition of fiber concrete

TAB (1). Fiber dosage

CONSTITUANTS	Fibres BEKAERT LB = 60mm Vf = 1%	Fibres AMORPHE LA = 30mm Vf = 0,5%
- Fibres	78 kg	36 kg
- Granulats: silico-calcaire concassé 5/20	839 kg	853,4 kg
- Sable: silico-calcaire 0/5	894,4 kg	896,2 kg
- Ciment CPA HP	425 kg	420 kg
- Eau	191,2 kg	189 kg
- 2% fluidifiant	6,5 kg	8,4 kg
- Temps d'écoulement en (s) au maniabilimètre.	10	14,4

Tableau (II-3) Composition des bétons de fibres testés à l'E.N.T.P.E.

III. Compressive Strength

Indeed, as already mentioned in summary, two types of metal fibers will be used: hook the fiber and the amorphous fiber iron. Two snap modes, the first works by hooking (FIG.01) while the second mode operates by adhesion. (Fig.02)

TAB(2) Characteristics of fibers used.

Fig. (1) Hook Fiber **Source(8)**

Fig. (2) Fibres flat castamorphous**Source (8)**

Fig. (03)compression failure mode for Concretehook fibers. **Source 5**

Fig. (04)compression failure mode for a concrete amorphousfibers **Source 5**

IV. SIMPLE COMPRESSION COMPARATIVE TESTING OF CONCRETE AND CLASSIC CONCRETE FIBER METAL

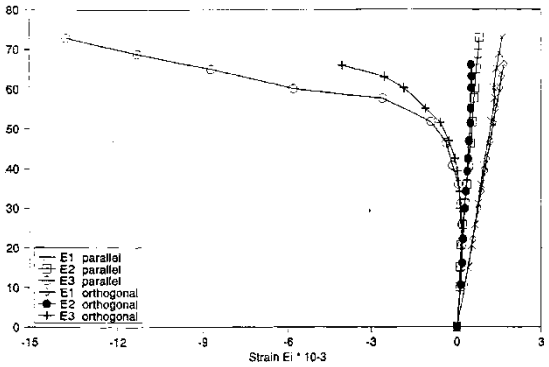

Fig (05) compression Comparative Test between conventional concrete and reinforced concrete (5).

These tests show first plans rupture of fiber concrete specimens parallel to the cargo plane, which means the proper distribution of the stress field at the anti-shrinking support. The second one notices the presence of the fibers improves little compressive strength of the concrete. It is still a difference between conventional concrete and fiber concretes. It is at the level of the overall behavior. Thus, fiber concrete shows increased ductility in the post-peak area.

V. COMPARATIVE SHEAR

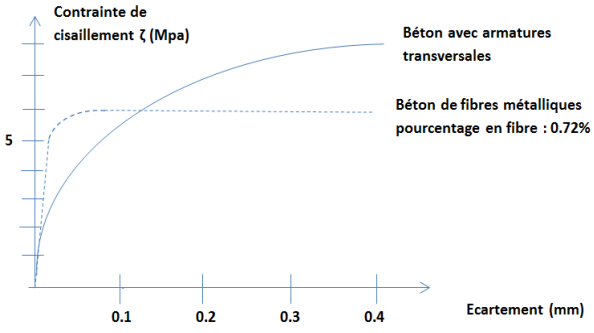

Fig. (06) Shear comparative test between concrete and fiber reinforced concrete under the influence of transverse reinforcement (stirrups) by (7).

Several tests on the metal fiber concrete were carried out to assess the fibers' effectiveness as shear reinforcement **[7].**

-The results show that:

-The presence of steel fibers reduces shear deformations.

- The fibers have a contribution to the resistance to shear similar to that of conventional transverse reinforcement.

Therefore the elimination of transverse reinforcement is possible when using the concrete with steel fibers for structural elements.

The fibers' effect is particularly significant to preserve the rigidity of beams and ductility; while limiting the crack width.

VI. CONCLUSION

The concrete material developments have indisputably led to new applications, including the impact, which cannot be underestimated.

In this present article, we dealt with the concrete material for the different values of characteristics that will optimize the formulation of the current concrete one, which we then used in formulating a fiber concrete. (8)

The compression tests and shearing of steel fiber concrete have allowed us to quantify the influence of the fibers on the cracking mode, the ductility of the material, and, on the other, to exploit these results benefit of certain risky designs under dynamic effect (shear failure).

Is attributed to fiber concretes compared to conventional concrete the following improvements:

- Increased deformability
- Better tensile and shear
- Limiting the crack width
- Improved impact, strength, and fatigue.

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