15th Civil Engineering Students Conference
2-4 Sep 2014, Urmia University

Stady Of Fiber Reinforced Concrete

Amir Ghaderi[1] , Maryam Shokri[2] , Azize Hosseinjany[3]

1- Civil Engineering University Of Tabriz , ghaderi_amir.civil@yahoo.com
2- Architectural Engineering University College Of Nabi Akram , a_maryam708@yahoo.com
3- Civil Engineering University Of Tabriz , hosseinjany_azize@yahoo.com

Abstract

Fiber reinforced concrete (FRC) is a new structural material which is gaining increasing importance. Addition of fiber reinforcement indiscrete form improves many engineering properties of concrete. Deterioration of concrete structures due to steel corrosion is a matter of considerable concern since the repairing of these structures proved to be a costly process. Repair and rehabilitation of the civil structures needs an enduring repair material. The ideal durable repair material should have low shrinkage, good thermal expansion, substantial modulus of elasticity, high tensile strength, improved fatigue and impact resistance. Reinforcing the concrete structures with fibers such as polypropylene is one of the possible ways to provide all the criteria of the durable repair material. This type of reinforcement is called Fiber Reinforcement of Concrete Structures. There is an increasing worldwide interest in utilizing fiber reinforced concrete structures for civil infrastructure applications.The transformation from a brittle to a ductile type of material would increase substantially the energy absorption characteristics of the fibre composite and its ability to withstand repeatedly applied, shock or impact loading .This paper describes the different types of fibers and the application of FRC in different areas. It also presents the mechanical properties and Structural Behavior of FRC and developments done on fiber reinforced concrete.

Keywords: Concrete, Fibers, Strength, Fatigue, Properties

1. Introduction:

Fibre reinforced concrete (FRC) may be defined as a composite materials made with Portland cement, aggregate, and incorporating discrete discontinuous fibres.

Now, why would we wish to add such fibres to concrete? Plain, unreinforced concrete is a brittle material, with a low tensile strength and a low strain capcity. The role of randomly distributes discontinuous fibres is to bridge across the cracks that develop provides some post- cracking “ductility”. If the fibres are sufficiently strong, sufficiently bonded to material, and permit the FRC to carry significant stresses over a relatively large strain capacity in the post-cracking stage.There are, of course, other (and probably cheaper) ways of increasing the strength of concrete. The real contribution of the fibres is to increase the toughness of the concrete (defined as some function of the area under the load vs. deflection curve), under any type of loading. Thatis, the fibres tend to increase the strain at peak load, and provide a great deal of energy absorption in post-peak portion of the load vs. deflection curve. When the fibre reinforcement is in the form of short discrete fibres, they act effectively as rigid inclusions in the concrete matrix. Physically, they have thus the same order of magnitude as aggregate inclusions; steel fibre reinforcement cannot therefore be regarded as a direct replacement of longitudinal reinforcement in reinforced and prestressed structural members. However, because of the inherent material properties of fibre concrete, the presence of fibres in the body of the concrete or the provision of a tensile skin of fibre concrete can be expected to improve the resistance of conventionally reinforced structural members to cracking, deflection and other serviceability conditions[1]. The fibre reinforcement may be used in the form of three – dimensionally randomly distributed fibres throughout the structural member when the added advantages of the fibre to shear resistance and crack control can be further utilised . On the other hand, the fibre concrete may also be used as a tensile skin to cover the steel reinforcement when a more efficient two – dimensional orientation of the fibres could be obtained.

2. Fiber Types

In this section each of the most commonly used fibre types is discussed, giving information on the manufacture of the fibre, its properties, fibre content in applications and the effects of the fibre type on concretes and mortar [3].