CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Nowadays, the application of fiber reinforcement in concrete is not new. There are many researchers focused on fiber application. The fiber can be made from either natural material (asbestos, sisal and cellulose) or a manufactured product such as glass, steel, carbon and polymer (Guneyisi. E. et al., 2013). Among the various types of fibers, steel fiber is the most commonly used for most structural and non-structural purposes (Bolat, H et al, 2014). In this research steel fiber have been used. The application of the steel fiber is mostly utilised in construction due to its ability in resisting the formation and growing of cracking, abrasion and enhances the flexural strength, fatigue strength of reinforced concrete (Altun. F. et al., 2012). From the study, the tensile and flexural strength of concrete enhanced significantly due to addition of steel fiber (Shahiron. S., 2009).

In this study, the behaviour of reinforced concrete beam with different aspect ratio of steel fiber added into mixture were focused. According to the ACI 544, 3R-08, aspect ratio is referred to the ratio of fiber length over the diameter. Normal range of aspect ratio for steel fiber is from 20-100mm. Aspect ratio of steel fiber greater than
100mm is not recommended because it will cause inadequate workability, formation of mat in the mix and also non uniform distributed

1.2 PROBLEM STATEMENT

The properties of the concrete in brittle material which is low in tensile strength and low in strain capacity. Low tensile strength and low strain at fracture were major deficiencies in plain concrete (Suguna. K. et al., 2015). The low tensile strength was attributed to numerous micro cracks in plain concrete. The rapid propagation at these cracks under applied stress was responsible for low tensile strength and brittle failure of material.

In structural application, the concrete will provide the reinforcing bars to carry the tensile force once the concrete has cracked, so that it remains largely in compression under load. As mentioned earlier, tensile failure strain of the reinforced concrete is significantly lower than the yield strain of the steel reinforced and the concrete crack before any significant load to transfer to the steel. In industry application, the steel reinforced needed to carry the tension forces in the concrete.

According to the problem of steel reinforced concrete in structural application and needed in industry application, a new application of reinforced concrete need to develop. So, from the previous research additional fiber is one of the methods to improve the mechanical properties of the structural concrete. According to M. Behloul, 2008, fiber reinforced concrete is one of these new materials ways for concrete structure. Because of that, in this study focused on the contribution of the steel fiber in mechanical properties of the reinforced concrete beam and the effect of aspect ratio the steel fiber in structural behaviour also was investigated.
1.3 RESEARCH OBJECTIVE

The objectives of this research are:

i. To determine the contribution of steel fiber in reinforced concrete beam under flexural load.

ii. To study the effect of fiber aspect ratio to the structural behaviour of reinforced concrete beam.

1.4 SCOPE OF STUDY

The scope of study for this research includes:

i. Type of fiber :
   Steel fiber with aspect ratio, \( l/d \) 80 mm and 65 mm

ii. Volume fraction, \( V_f = 1 \% \)

iii. Concrete grade = 25 Mpa

iv. Type of specimens:
   I. Cube specimen = (width x breadth x height)
   \[ = (150 \text{ mm} \times 150 \text{ mm} \times 150 \text{ mm}) \]
   II. Beam specimen = (length x width x height)
   \[ = (750 \text{ mm} \times 150 \text{ mm} \times 150 \text{ mm}) \]

1.5 RESEARCH SIGNIFICANCE

Numerous researches have been performed on mechanical properties of fiber concrete and concrete structural member with fiber under various loading. So, the study of the behaviour to the reinforced concrete beam with steel fiber was studies. In the present investigation, the influence the aspect ratio of steel fiber on strength and flexural behaviour of concrete beam were studies.