

Experimental study on effects of steel fiber volume on mechanical properties of SFRC

Abstract

In recent years, considerable interest has developed in using fibers to increase the loadcarrying capacity of concrete members. Fibers significantly reduce the brittleness of concrete and improve its engineering properties, such as tensile, flexural, impact resistance, fatigue, load bearing capacity after cracking and toughness. However, studies on the exact amount of influence are very limited. Among fibers, steel fibers are one of the most popular and widely used types of fibers in both research and practice. Steel fiber-reinforced concrete (SFRC) has been used increasingly in recent years and has a lot of applications. Previous researchers have mentioned that using fiber as 0.5 – 2.5 % of the volume of concrete can significantly improve the concrete properties. The purpose of this paper is firstly to investigate the effects of fiber volume on the compressive, splitting, and flexural behaviors of SFRC, and secondly to compare modes of failure. Variable items are the steel fiber volume fraction and the curing day. A series of 108 specimens (cube, cylinder and prism) with four different steel fiber volumes are used by a ratio of 0, 0.7, 1.0 and 1.5%. All specimens are cured in a water tank for 7, 14 and 28 days, respectively to provide same conditions. Hooked-ended steel fibers with a length of 30mm and a diameter of 0.75 mm are used.