Abstract

This research studies the mechanical properties of polyester polymer concrete under compressive and flexural loads by varying the mix proportions for searching the optimal proportion, which provides the high strength and good workability. Moreover the effects of each composition on the mechanical behavior and properties of polymer concrete have been studied. Those are resin content, fineness modulus of fine aggregate, coarse aggregate content and glass fiber content. The cylindrical and beam specimens were prepared according to ASTM standard for the compression and the flexural tests, respectively. The preparing and curing of specimens were performed under room temperature and atmospheric pressure. The specimens were curing for 7 days before testing. Based on the test results, it is seen that the optimal proportion of the polymer concrete without coarse aggregate is the ratio between resin and sand of 1 : 4.6 by weight (or 1 : 3.3 by volume), which provides the average compressive strength of 75.8 MPa. The optimal proportion of the polymer concrete with coarse aggregate is the ratio between resin, sand and crushed rock of 1 : 3.7 : 3.7 by weight (or 1 : 2.6 : 2.1 by volume), which provides the average compressive strength of 80.6 MPa. The compressive and flexural strengths are mainly controlled by the varying resin content. The optimal resin content is varying from 12 to 18 percent which depends on the amount of coarse aggregate in the mix composition. The fineness modulus of fine aggregate has no influence on the compressive strength but it enhances the flexural strength, significantly. The stiffness and compressive strength are obviously increasing by admixing the coarse aggregate at the optimal content. The glass fiber increases the ductility of polymer concrete but they reduce the molding ability which drops off slightly the compressive and flexural strengths.