

Slip-formed load-bearing wall panels using cement and crusher dust: Material Properties

Composite of cement, crusher dust, and coir is being used to build load-bearing walls of building structures using a special construction technique called slip-formed method (introduced by A N S Kulasinghe in mid 80s). However, the construction of buildings using this method is restricted up to five floors due to non-availability of essential design parameters (i.e. mechanical and material properties of the composite). Therefore an extensive experimental program was carried out to find the material properties of the composite.

In present investigation, an attempt was made to simulate actual method of construction in the field as far as possible in preparation of test specimens, particularly in method of compaction and curing of specimens while the previous investigation carried out to find the material properties was done according to the equivalent British standards.

From the results, it can be observed that a progressive increase in compressive strength with the age, which range from 0.75 MPa (1:12 at 1 day) to 11.95 MPa (1:6 at 28 days). It is also found that with the increasing cement content the Young's modulus increases from 5.98 GPa to 10.65 GPa, Poisson's ratio decreases from 0.17 to 0.12, flexural strength increases from 0.315 to 1.402 N/mm² and splitting tensile strength increases from 0.499 to 1.541 N/m². The specific weight ranges from 1.885 to 1.953 and the average specific weight is 1.9.

One of the main objectives of this study is to use these slip-formed load-bearing walls for medium rise buildings with 10-12 floors. This investigation will be carryout partly by developing a computer model using finite element technique. As the accuracy of the results from the computer model will highly depend on the material properties of the composite, the material properties obtained from this experimental program will be helpful to get better results.

It can be concluded that, as this particular method of testing is very much closer to the actual construction method, the strength parameters found in this test series will be a better representation of this special composite material.