Permeability of stressed concrete and Role of fiber Reinforcement.

Abstrak

Water permeability of plain and fiber reinforced concrete was measured with and without and applied compressive stress. For the measurement of permeability under stress , a novel test technique was developed, in this technique , two hollow core concrete cylinders were simultaneously tested -one with stress and the other without using indentical flow conditions. A special design of the permeability cell eliminates leakage and allows the specimen to achieve conditions of flow equilibrium early in the test. For the stressed specimens , two levels of the applied stress , 0.3 Fu and 0.5 fu where fu is the ultimate strength of concrete in compression were investigated. A collated cellulose fiber at volume fractions of 0.1, 0.3 and 0.5% was used.

Results indicated that in the unstressed state, fiber reinforcement reduces the permeability of concrete. For the stressed concrete on the other hand, and interesting phenomenon was observed. Initially as the applied stress was increased , a reduction in the permeability for both plain and fiber reinforced concrete was observed. This reduction, however , occurred only to a certain threshold value of stress . Beyond this threshold, a rapid increase in the permeability occurred for plain concrete. For fiber reinforced concrete as well, an increase in the permeability was noticed beyond the threshold value of stress, but the permeability still remained below the unstressed level.