

Sustainable Underground Structures Through Soil-Driven Bio-Protection of Concrete

Authors : Abdurahim Abogdera, Omar Hamza, David Elliott

Abstract : The soil bacteria can be affected by some factors such as pH, calcium ions and Electrical conductivity. Fresh concrete has high pH value, which is between 11 and 13 and these values will be prevented the bacteria to produce CO₂ to participate with Calcium ions that released from the concrete to get calcite. In this study we replaced 15% and 25% of cement with Fly ash as the fly ash reduce the value of the pH at the concrete. The main goal of this study was investigated whether bacteria can be used on the soil rather than in the concrete to avoid the challenges and limitations of containing bacteria inside the concrete. This was achieved by incubating cracked cement mortar specimens into fully saturated sterilized and non-sterilized soil. The crack sealing developed in the specimens during the incubation period in both soil conditions were evaluated and compared. Visual inspection, water absorption test, scanning electron microscopy (SEM), and Energy Dispersive X-ray (EDX) were conducted to evaluate the healing process.

Keywords : pH, calcium ions, MICP, salinity

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