

Characterization of Shrinkage-Induced Cracking of Clay Soils

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Abstract : In our present society, raw earth presents an alternative as an energy-saving building material for dealing with climate and environmental issues. Nevertheless, it has a sensitivity to water, due to the presence of fines, which has a direct effect on its consistency. This can be expressed during desiccation, by shrinkage deformations resulting in cracking that begins once the internal tensile stresses developed, due to suction, exceed the tensile strength of the material. This work deals with the evolution of the strain of clay samples, from the beginning of shrinkage until the initiation of crack, using the DIC (Digital Image Correlation) technique. In order to understand the origin of cracking, desiccation is studied for different boundary conditions and depending on the intrinsic characteristics of the material. On the other hand, a study of restrained shrinkage is carried out on the ring test to investigate the ultimate tensile strength from which the crack begins in the dough of clay. The purpose of this test is to find the type of reinforcement adapted to thwart in the cracking of the material. A microscopic analysis of the damaged area is necessary to link the macroscopic mechanisms of cracking to the various physicochemical phenomena at the microscopic scale in order to understand the different microstructural mechanisms and their impact on the macroscopic shrinkage.

Keywords : clayey soil, shrinkage, strain, cracking, digital image correlation

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