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THE INFLUENCE OF FRACTURE AND PLASTICITY IN MESO-SCALE ON MACRO BEHAVIOR OF CONCRETE

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ABSTRACT: Concrete structures during their life time are affected by environmental actions such as chloride penetration and carbonation, alkali-aggregate-reaction, alkali-silica reaction, frost action, etc. Those actions cause plasticity and fracture in concrete structures even before application of mechanical loading. This paper attempts to study the influence of fracture and plasticity on mechanical behavior of concrete under loading. Since concrete is heterogeneous material consisting mortar, aggregate and its interface, analysis in meso-scale was conducted. It was found that fracture fraction in meso-scale affects strength and stiffness of concrete in compression and tension. However, meso-scale plasticity does not affect tensile strength, tensile stiffness, compressive strength, but affects compressive stiffness.

KEYWORDS: fracture, plasticity, meso-level, constitutive models, macro behavior