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INVESTIGATION OF STRESS - STRAIN BEHAVIOUR OF RECYCLED AGGREGATE CONCRETE UNDER CYCLIC LOADS

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Abstract

The recent awareness about recycling also involves the resources used in civil engineering. The use of Recycled Aggregate Concrete (RAC) has several advantages in terms of conservation of natural resources and of reduction of pollution. Although the interest on the use of structural concrete with recycled aggregates is increasing, extensive studies on the mechanical behaviour of such materials that can allow their use in alternative to standard concrete are still lacking. As a consequence most of the structural codes do not provide any information on the mechanical characteristics of RAC while other codes just provide very basic information. This paper presents the results of an experimental investigation about the mechanical behaviour of recycled aggregate concrete under uniaxial and cyclical compressive loads. Both monotonic complete stress–strain curves and cyclic behaviour under high-level compressive loads were analysed. Stress – strain behaviour of RAC is particularly significant for a subsequent analytical investigation of the mechanical behaviour of the material. Indeed, the envelope diagram provides the modulus of elasticity, the elastic deformation, the proportional limit, the peak resistance and the total elongation, useful to understand the mechanical capabilities of the material and to plan further experimental tests. The cyclic tests were made with repeated loads with values varying between 25% and 75% and between 25% and 80% of the peak load. The aim of the tests was to evaluate the decay of the mechanical properties over time due to fatigue-induced damage. Three different percentages of recycled coarse aggregate, namely 0%, 50% and 100%, have been investigated in each test. The objective of the experimentation is to provide more information on the mechanical properties of concrete with recycled aggregates in order to better model their behaviour and to enhance their use in civil engineering.

Key words: compressive test, cyclic loads test, recycled aggregate concrete, stress-strain curve

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