LAYERED FIBERCONCRETE ELEMENT STRENGTH

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INTRODUCTION

Fiberconcrete is important material for load bearing structural elements. Traditionally fibers are homogeneously distributed in a concrete volume. At the same time in many situations, fiberconcrete with homogeneously dispersed fibers is not optimal (majority of added fibers are not participating in a loads bearing process). It is obvious, that is possible to create constructions with oriented fibers distribution in them, in different ways. Present research is devoted to one of them.

EXPERIMENTAL METHODS

Fiberconcrete prisms were created with oriented fibers in a concrete inside them. Fibers orientation process was consisted of: a) concrete (without fibers) mixture preparation and it placing into the mould; b) fibers (having necessary orientation) placing into the concrete [1, 2]. Numerical fracture model for the beam, having one magistral crack and is subjected to bending, was created. Depending on crack size and opening, different crack parts are bearing different loads across the beam thickness. The load is carried by each fiber at a constant crack opening is known from micro-mechanical investigations. Layered 100×100×400 mm beams with oriented fibers located in plies were fabricated. Beams were experimentally tested under four point bending conditions. Fibers were incorporated into concrete specimens in four different ways. During bending, macro-crack is starting at the bottom side of the beam. This is why the maximal fiber content in prepared beams was concentrated at the bottom side of the beam. Prediction results were discussed. The both crack surfaces were investigated, for every broken prism, with the goal to validate fracture process model and to improve elaborated model's assumptions.

According to the testing results, specimens with non-uniform (layered) fibers distribution in sample body were reached the highest load carrying capacity during crack opening stage as they had the highest concentration of fibers in the part of prisms subjected to maximum tensile stresses.

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