

# Fiberconcrete Structural Elements with Oriented Fibers Structure

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**Keywords** – steel fiber, concrete, fiber orientation, orientation function.

During last few years steel fiber reinforced concrete has been used for tunnel linings, industrial floor slabs, piles and the field of its applications is continuously expanding. Commercially produced 0.6 to 6 cm long, with various types of geometrical and cross-section's forms steel fibers are widely used nowadays as a concrete disperse reinforcement. Although there is no question about the contribution of fibers to enhance concrete post cracking tensile load bearing capacity, the question of how to reduce experimental results scatter is still very important. A number of test methods have been proposed, but all have significant problems associated with either the variability of the results and their application in structural design calculations. One possibility to solve this problem is to use fiberconcrete with internal oriented fibers structure. In this work fiberconcrete prisms with oriented (in each prism longitudinal direction) short steel fibers structure were elaborated:

- precise amount of fibers was added to concrete, mixed and was placed into a mould;
- two specially elaborated metallic combs (see Fig.1.) were prepared;
- mould with fiberconcrete was placed on the shaking table and simultaneously fibers in the mould were combed. This operation was executed few times.

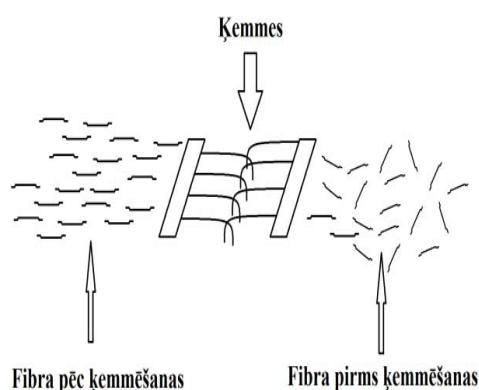


Fig.1. Method of fibers orientation.

Displacement between each comb two adjacent teeth was smaller than the length of a fiber, and was bigger than cross-section size of a bigger concrete aggregate's largest linear size. Vibration was applied during the process. Fiber orientation results were controlled by X-ray pictures analysis. Prisms with oriented and chaotically (non-oriented) distributed fibers were tested by ultrasonic device, measuring ultra-sound waves velocity dependence on fibers orientation in the samples and fibers concentration (see Fig.2). After that all prisms were loaded by 4 point bending till rupture.

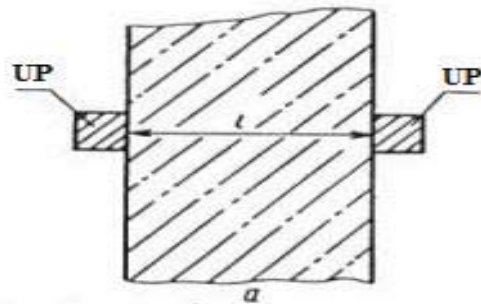


Fig.2. Samples testing by ultrasonic device, UP – ultra sound converters.

Numerical prism post-cracking behavior was modeled used previously elaborated model. Modeling results were successfully compared with experiments.

## REFERENCES

- [1] V.Lapsa, A.Krasnikovs, K.Strauts „Fiberconcrete non-homogeneous structure element building technology, process and equipment”, Latvian patent Nr. P-10-151, 2010, November 10.