

Fiberconcrete with nano-particles and carbon nano-tubes

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Fibers are added to the concrete in order to improve its mechanical properties. In the present work the role of water/cement ratio, addition of micro and nano admixtures and carbon nano-tubes to steel fiber reinforced concrete (SFRC) were investigated. After macro crack opening, bearing capacity of SFRC beam is determined by all crossing the crack fibers pulling out mechanism. At the same time, it is worth to mention that at the stage of concrete maturing, matrix shrinkage is leading to micro and nano cracks formation around every embedded fiber. Addition of carbon nano-tubes can work as nano-sized reinforcement bridging shrinkage raised micro-cracks forming around macro-fibers and is very exciting and interesting research direction in cement and concrete technology. Fiber pull-off behaviour and compressive strength of samples were tested using three types of cement matrix: low strength, normal strength and high strength. In the realized experiments pull-out curves were shown high scatter of the experimental results for all series of samples. In spite of that, positive role of micro and nano admixtures and carbon nano-tubes in increase of pull-out force was recognized. Immense differences of pull out forces were detected: normal strength composition shows 5 times higher result, but high strength 9 times higher than low strength cement matrix.

Experimental results confirmed that the highest effect of improving fiber bond with cement matrix shown high strength concrete matrix modified by micro/nano – sized admixtures. It makes possible to utilize fibers more effectively and to obtain more optimal FRC compositions with minimal content of fibers.