Bulding code developments for FRC structures

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Fiber reinforced concrete (FRC) is a composite material characterized by an enhanced post-cracking tensile residual strength due to the capacity of fibers to bridge the crack faces.
During the last four decades, a wide research has been performed on the material properties of FRC, both at fresh and hardened state. However, research on the structural response of FRC elements was mainly developed during the last fifteen years. As a consequence, there is still a lack of International Building Codes for structural design of FRC elements. This may explain the limited utilization of FRC among practitioners, even though a number of design guidelines were recently developed. In fact, clear and simple design rules from Building Codes are strongly required by designers who hardly accept to adopt voluntary guidelines or, even worse, research results available in scientific papers.
Within *fib* (Fédération Internationale du Béton) the Special Activity Group 5 (SAG 5) is preparing a New *fib* Model Code that aims to update the previous CEB-FIP Model Code 90, published in 1993. The New Model Code includes several innovations and addresses, among other topics, new materials for structural design.
Because of the better knowledge of FRC and the recent worldwide developments of guidelines for structural design, SAG 5 decided to introduce some sections on FRC with the aim of providing guidance to engineers to properly (and safely) design FRC structural elements both at serviceability and ultimate limit states, based on the state-of-the-art knowledge.
As the previous one, this new fib Model Code will be likely considered as the reference document for next Eurocodes. In any case, the European Standard on Concrete (EN 206-1) is now under revision and will probably include Fiber Reinforced Concrete.
This presentation aims to introduce some principles governing structural design of FRC elements made of ordinary concrete. The main concepts were derived from some national and international guidelines for FRC structural design. The principles discussed herein are mainly obtained from research on (post-cracking) softening steel FRCs in uniaxial tension, even though they can be extended to hardening materials.
Some examples of structural applications with FRC are also presented.