EXPERIMENTAL STUDY OF LAYERED STEEL FIBRE REINFORCED CONCRETE BEAMS

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The wide use of steel fibre to the concrete matrix substantially change the properties of the base materials, increasing its ductility and flexural strength and improving crack control [1].

In many cases, the fibres are used in structural applications along with traditional reinforcement, partially or totally replacing them.

The compression strength of a concrete and the tensile strength of steel fibre reinforced concrete (SFRC) are only slightly affected by the volume of fibres.

Fig. 1: Multilayered beam (SFRC in external layers and RC in the internal one) during the flexural esay.

The influence of steel fibres in flexural behaviour is much greater comparing to compression due to the duc tile behaviour of SFRC in the area of the stress rupture, with the development of residual strength after the cracking of the concrete. [2].

In all cases studied, the toughness can be significantly increased, when the steel fibres have formed (hooked) ends [3]. The greater compression strength of SFRC could be very useful in preventing structures from sudden failure due to static loads or dynamic loads [4]. This improvement is caused by chaotic distribution of steel fibres in concrete matrix restricting deformation of the concrete and significantly improving the ductility. [5].

The characteristics of the steel fibre give it extraordinary ductility after cracking in the concrete matrix. The ductility depends on the type, anchoring properties and volume of fibre used. The significant effect can be reached; the fibres have a crimped, waved, deformed surfaces shapes or hooked ends. These fibres are more effective than their straight, uniform equivalents with the same length and diameter.

The main aim of this research is to analyse the flexural behaviour of multi-layer beams, which use SFRC on the external layers and conventional concrete (RC) in the internal one. This paper presents test program of two types of layered beams, subjected for flexure. The test results of layered beams are compared with the test results of conventional monolithic RC and SFRC beams. (Fig. 1).

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