INVERSE TECHNIQUE FOR INVESTIGATION OF THE POST-CRACKING BEHAVIOUR OF SFRC MEMBERS IN FLEXURE

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ABSTRACT

Steel fibre reinforced concrete (SFRC) is a cement-based material reinforced with randomly distributed fibres. The addition of fibres into the concrete matrix counteracts its brittleness, producing material with increased ductility, toughness and post-cracking stiffness as well. Due to the ability of fibres to transfer stresses through the crack plane, cracked SFRC is able to carry a certain portion of tensile stresses. Therefore post-cracking strength can be considered as the main parameter describing the effectiveness of fibres and concrete interaction. Stresses resisted by cracked SFRC are known as residual and can vary significantly depending on the fibre amount and mechanical properties of fibres and concrete [1].

The paper deals with experimental and theoretical investigation of the post-cracking behaviour of SFRC. Experimental results of six notched beams with fibre contents of 0.5 and 1.0% by volume subjected to three-point loading scheme are presented. Considering SFRC as a homogeneous material, the inverse analysis technique is proposed for determination of the residual stresses of SFRC in tension. To verify the calculated results a numerical modelling is utilized employing a nonlinear finite element analysis program ATENA. Simulated load-crack width curves were compared with the experimental data validating adequacy of the proposed model.

REFERENCES

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