Abstract

A novel methodology is developed for predicting the load carrying capacity of elevated steel fibre reinforced concrete (E-SFRC) slab systems. In the proposed approach the depth of slab’s cross section is discretized into several layers, and the number of steel fibres per each layer is determined by considering the distribution of fibres along the depth of cross section. This information, together with the one obtained from the three-point notched beam bending tests performed on four series of SFRC made of different concrete strength class and content of fibres, have provided the stress-crack width laws for defining the post-cracking behaviour of each layer. These constitutive laws are implemented in a numerical model developed based on the moment-rotation approach for determining the positive and negative resisting bending moment of the slab’s unit width cross section. By using the yield line theory, the load carrying capacity of E-SFRC slab is predicted for the most current load conditions. Predictive performance of the proposed methodology is assessed comparing to the results recorded in experiment and the ones obtained by the numerical simulation. The developed model is utilised in a parametric study to evaluate the influence of parameters that affect the load-carrying capacity of E-SFRC slabs.