

Study of the behaviour of reinforced concrete slabs subjected to concentrated loads near supports

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ABSTRACT

The behaviour of reinforced concrete slabs subjected to concentrated loads near supports is investigated. An experimental test program was carried out at Delft University of Technology on eighteen large-scale reinforced concrete slabs. Three of the slabs tested have been chosen as case studies and analyzed with nonlinear finite element (NLFE) analyses and with analytical models, proposed by the standard codes and available in literature. The aim of the research is to investigate the prediction of the carrying capacity of the slabs obtained through simplified analytical and numerical procedures, usable by analysts in the current design process.

The analyses are carried out in the framework of a further development of guidelines for nonlinear finite element analysis, issued by the Dutch Ministry of Public Works and the Environment. This ministry managed a project for the re-evaluation of the carrying capacity of existing bridges and viaducts, because of the increase of traffic and the reallocation of emergency lanes to traffic lanes through the use of NLFE analyses. The results of NLFE analyses strongly depend on the modelling choices and therefore a large scatter in the results for the same structure analyzed by different analysts can be detected. For this reason the availability of guidelines on how to perform NLFE analyses is of big help for the analyst.

The research also matches with the philosophy of the Model Code 2010 that provides different analytical and numerical calculation methods for the evaluation of the design shear resistance of reinforced concrete elements according to different safety levels of approximation.

REFERENCES

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