Due to the significant weight of the elements, which raise the construction and transportation costs and the CO2 production, concrete buildings may not meet the requirements for sustainable constructions. Furthermore, concrete is quite vulnerable to fire, as it undergoes a permanent degradation of its mechanical properties at temperatures commonly reached by structural elements during a fire in a building. As a consequence, several multi-story concrete buildings have collapsed or suffered major structural damages because of fire, and caused injuries and casualties among the occupants. Even in those cases, where a safe evacuation of the building is ensured, the high costs associated with the downtime and reparation of the building can be very high and not acceptable in the view of a safe and sustainable design of structures. In this respect, the newly patented building technology of superlight elements invented at DTU seems very promising in reducing the weight of the elements and improving their structural integrity in case of fire or other accidental actions. In particular, the behaviour under fire of a superlight floor slab element (SL-deck) is investigated in this paper. The implementation of a three-dimensional Finite Element Model (FEM) of the SL-deck is described and modelling aspects are discussed with particular reference to the sensitivity of the model to the thermal properties of the strong and light concrete. The results of the investigation are compared with the outcomes of a fire test performed on a prototype slab. The implementation of a FEM is useful in order to predict the structural behaviour of the slab under different fire and boundary conditions. However, the relevance of the study lies in particular in the presentation of a methodology for the investigation of the fire performances of complex concrete elements and in the focus on modelling issues related to the handling of the uncertainties. © 2013 Taylor & Francis Group.

General information
Publication status: Published
Organisations: Department of Civil Engineering, Section for Building Design, COWI A/S, Ramboll Group AS
Contributors: Hertz, K. D., Campeanu, B., Giraudo, M., Giuliani, L.
Number of pages: 6
Pages: 1937-1942
Publication date: 2013

Host publication information
Title of host publication: Research and Applications in Structural Engineering, Mechanics and Computation : Proceedings of the 5th International Conference on Structural Engineering, Mechanics and Computation, SEMC 2013
Publisher: CRC Press/Balkema
ISBN (Electronic): 978-1-315-85078-8
Keywords: Carbon dioxide, Chemical elements, Concrete buildings, Concretes, Flammability testing, Mechanical properties, Mechanics, Patents and inventions, Structural design, Uncertainty analysis, Fires, Building technologies, Structural behaviour, Structural damages, Structural elements, Sustainable construction, Sustainable design, Three dimensional finite element model, Transportation cost
Source: Findit
Source-ID: 256452997
Research output: Chapter in Book/Report/Conference proceeding › Article in proceedings – Annual report year: 2014 › Research › peer-review