THE UNIVERSITY OF HONG KONG

DEPARTMENT OF CIVIL ENGINEERING

SEMINAR

The cover effect on the cracking of concrete prisms with various arrangements of bar reinforcement

by

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Time: 2:00 p.m. - 3:00 p.m.
Venue: Room 632C, 6/F, Haking Wong Building, The University of Hong Kong

ABSTRACT

Cracking effects are the intrinsic attribute of serviceability analysis of reinforced concrete elements. These effects are the research object of numerous studies, which have been carried out for more than half a century. Although different setups developed for the analysis of the serviceability properties (cracking and deformations) of reinforced concrete elements, tensile tests are remaining the most often used testing layouts. Recent studies, however, have revealed noticeable limitations of the traditional experiments on concrete prisms reinforced with a centre bar. Inter-correlation of the basic cross-section parameters (i.e. bar diameter, reinforcement ratio, and cover depth) does not enable the adequate interpreting test results. Special equipment for the anchorage of multiple bars was developed in VGTU to solve these problems.

The focus of the seminar is to examine the influence of the cross-section parameters on the cracking behaviour of concrete elements subjected to tension. The experimental campaign encompasses 30 concrete prisms reinforced with multiple bars. All specimens had an identical 150×150 mm cross-section. A number of the bars, bar diameter, and cover depth were among the test variables. The bars were distributed in the cross-section ensuring 15 mm, 30 mm, 40 mm and 50 mm depth of concrete cover. The cracking results only partially supported the generally accepted concept that relates crack widths to crack spacing. The maximal crack was located next to the uncracked block of maximum length in 60% of the considered prisms, whereas the maximum crack-opening occurred between the two blocks of whose sum is maximum in only one case. Adequacy of the crack prediction model from Model Code 2010 was examined identifying tendencies that may point to potential improvements in the model. Deformation behaviour of the specimens also modelled with a tailor-designed bond modelling approach for rigorous finite element analysis. The modelling results reveal that the average deformations of the concrete and steel reinforcement are different and are dependent on the reinforcement configurations. Thus, the efficiency of concrete in tension requires a reconsideration for the rational design of structural elements.

ABOUT THE SPEAKER

Dr Viktor Gribniak is a Chief Researcher, the Head of Laboratory of Innovative Building Structures. He is also a Professor of Department of Steel and Composite Structures. Research interests of Dr V. Gribniak cover mechanics of composite materials; long-term effects, fracture mechanics, high-temperature effects on material properties of structural components; experimental investigation, constitutive and numerical modelling of engineering structures. He is a co-author of more than 160 scientific publications, 59 articles published in journals with Impact Factor referred in Clarivate Analytics (former Thomson Reuters) Web of Science database. H-index of Dr V. Gribniak is 15. In 2013, V. Gribniak (together with Prof. G. Kaklauskas) received the “Moisseiff Award” by the American Society of Civil Engineers (ASCE). Since 1948, the best article nomination annually awarded for the essential input in structural design and theoretical analysis.

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