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New concepts in crack and deformation analysis of reinforced concrete structures

The presentation will cover important aspects of the analysis and design of Reinforced Concrete (RC) structures for serviceability. Main effects having the influence on deformation and crack analysis of RC structures will be discussed. The existing approaches of deformation and crack analysis of RC structures will be briefly reviewed. A new concept of crack analysis of RC members based on compatibility of mean strain and stress transfer approaches will be introduced. The governing parameters of crack spacing are obtained by equating mean strains of the tension reinforcement defined by these approaches. It is assumed that a single RC block of a length of mean crack spacing represents the averaged deformation behavior of the cracked member. Based on the experimental evidence, the reinforcement strain within the block is characterized by a strain profile consisting of straight lines representing zones with different bond characteristics: the debonding, effective and central zones. The sum of the above will result in the crack spacing. To arrive at rational constitutive modeling, the derivation of tension stiffening relationships using the inverse technique will be explained. This is followed by the elimination of shrinkage effect on curvatures and tension stiffening. An account of the accuracy of deformation predictions by various techniques will be given.

Biography

Gintaris Kaklauskas is Professor of Department of Reinforced Concrete Structures and Geotechnique and Director of Research Institute of Building and Bridge Structures at Vilnius Gediminas Technical University (VGTU). He received his PhD and DrSc (Habil Dr) degrees from VGTU and is a real member of Lithuanian Academy of Sciences. He is the recipient of many awards and recognitions, including ASCE best paper Moisseiff Award 2013, Lithuanian Science Prize 2013 and Marie Curie (Senior Research category) grant. He has been a visiting professor (under Fulbright fellowship) at University of Illinois, Urbana-Champaign. His research interests include service ability analysis and constitutive modeling of concrete structures.

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