

Evaluation and Control of Cracking for Bending Reinforced One-way Concrete Voided Slab with Plastic Hollow Inserts

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Abstract : Analysis of experimental tests data of bending one-way reinforced concrete slabs from various articles of science revealed that voided slabs with a grid of hollow plastic inserts inside have smaller mechanical and physical parameters compared to continuous cross-section slabs (solid slabs). The negative influence of a reinforced concrete slab is impacted by hollow plastic inserts, which make a grid of voids in the middle of the cross-sectional area of the reinforced concrete slab. A formed grid of voids reduces the slab's stiffness, which influences the slab's parameters of serviceability, like deflection and cracking. Primary investigation of data established during experiments illustrates that cracks occur faster in the tensile surface of the voided slab under bending compared to bending solid slab. It means that the crack bending moment force for the voided slab is smaller than the solid slab and the reduction can vary in the range of 14 - 40 %. Reduce of resistance to cracking can be controlled by changing a lot of factors: the shape of the plastic hollow insert, plastic insert height, steps between plastic inserts, usage of prestressed reinforcement, the diameter of reinforcement bar, slab effective depth, the bottom cover thickness of concrete, effective cross-section of the concrete area about reinforcement and etc. Mentioned parameters are used to evaluate crack width and step of cracking, but existing analytical calculation methods for cracking evaluation of voided slab with plastic inserts are not so exact and the results of cracking evaluation in this paper are higher than the results of analyzed experiments. Therefore, it was made analytically calculations according to experimental bending tests of voided reinforced concrete slabs with hollow plastic inserts to find and propose corrections for the evaluation of cracking for reinforced concrete voided slabs with hollow plastic inserts.

Keywords : voided slab, cracking, hollow plastic insert, bending, one-way reinforced concrete, serviceability

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