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Concrete hydration behavior and crack tendency based on electrical resistivity and restrained shrinkage test

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Hydration process, crack potential and setting time of concrete grade C30, C40 and C50 were separately monitored using non-contact electrical resistivity apparatus, a novel plastic ring mould and penetration resistance method respectively. The results show highest resistivity of C30 at the beginning until reaching the acceleration point when C50 accelerated and had overtaken others, and this period corresponds to its final setting time range, from resistivity derivative curve. Hydration process can be divided into dissolution, induction, acceleration and deceleration periods, restrained shrinkage crack and setting time tests demonstrated the earliest cracking and setting time of C50. Therefore, this method conveniently and rapidly determines the concrete's crack potential. The highest inflection time (t_i), the final setting time (t_f) were obtained and used with crack time in coming up with mathematical models for the prediction of concrete's cracking age for the range being considered. Finally, ANSYS numerical simulations support the experimental findings in terms of the earliest crack age of C50 and the crack location that, highest stress concentration is always beneath the artificially introduced expansion joint of C50.

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Precast concrete floor system using funicular shells– A sustainable construction technology

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The ever increasing problem of housing to the people has high priority in attaining sustainable development. Hence it is required to address the mass requirement in housing and approach this problem with suitable technology. Simple and feasible technologies are in demand to cater to the needs of affordable housing in urban and rural sectors in developing countries. There are a number of roof and flooring systems available other than conventional concrete slab. Some technological solutions were esoteric, but affordable to the common people. An innovative simplified solution with precast concrete funicular shell is presented here. A novel semi pre-fabricated flooring system has been developed using precast concrete funicular shells. Funicular shell, a special type of shell doubly-curved in shape distributes the load in all directions equally to withstand loading purely in compression in most parts of the shell. This property of the shell has been taken advantageously to distribute the load. This flooring system consists of precast concrete funicular shells, precast concrete I shaped thin beams supporting the shells and cast *in-situ* screed. This system provides quick and easy prefab technology for roof and flooring. Besides giving an aesthetic appearance, this system eliminates onsite formwork and plastering, making it feasible and affordable. Experimental studies on precast concrete funicular shells and precast concrete thin beams have been conducted for its structural adequacy. This paper presents the concept of the system and experimental studies carried out on the components.

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