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An Experimental Study on Service Life Prediction of Self: Compacting Concrete Using Sorptivity as a Durability Index

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Abstract : Permeation properties have been widely used to quantify durability characteristics of concrete for assessing long term performance and sustainability. The processes of deterioration in concrete are mediated largely by water. There is a strong interest in finding a better way of assessing the material properties of concrete in terms of durability. Water sorptivity is a useful single material property which can be one of the measures of durability useful in service life planning and prediction, especially in severe environmental conditions. This paper presents the results of the comparative study of sorptivity of Self-Compacting Concrete (SCC) with conventionally vibrated concrete. SCC is a new, special type of concrete mixture, characterized by high resistance to segregation that can flow through intricate geometrical configuration in the presence of reinforcement, under its own mass, without vibration and compaction. SCC mixes were developed for the paste contents of 0.38, 0.41 and 0.43 with fly ash as the filler for different cement contents ranging from 300 to 450 kg/m3. The study shows better performance by SCC in terms of capillary absorption. The sorptivity value decreased as the volume of paste increased. The use of higher paste content in SCC can make the concrete robust with better densification of the micro-structure, improving the durability and making the concrete more sustainable with improved long term performance. The sorptivity based on secondary absorption can be effectively used as a durability index to predict the time duration required for the ingress of water to penetrate the concrete, which has practical significance.

Keywords : self-compacting concrete, service life prediction, sorptivity, volume of paste
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