Influence of alkali-silica reaction and crack orientation on the uniaxial compressive strength of concrete cores from slab bridges - DTU Orbit (05/05/2019)

Influence of alkali-silica reaction and crack orientation on the uniaxial compressive strength of concrete cores from slab bridges

For a reliable structural analysis and risk assessment of concrete structures damaged by alkali-silica reaction (ASR), knowledge of the concrete compressive strength is essential. This comprehensive study investigates the residual compressive strength of concrete cores drilled from three severely ASR-damaged flat slab bridges in service. Furthermore, the influence of the ASR-induced crack orientation on the compressive strength and the Young's modulus is investigated. Uniaxial compression tests, visual observations, and thin section examinations were performed on more than 100 cores drilled from the three severely ASR-damaged flat slab bridges. It was found that the orientation of ASR-induced cracks has a significant influence on the uniaxial compressive strength and the stress strain relationship of the tested cores. The compressive strength in a direction parallel to ASR cracks can be significantly higher than the strength in the direction perpendicular to ASR cracks. It is proposed that for an increasing amount of ASR-induced cracks in the extracted cores the anisotropic concrete behaviour in compression will be reduced. (C) 2018 Elsevier Ltd. All rights reserved.

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