



The microscopic signs of ASR in experimental specimens compared with concrete samples

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The products of alkali-silica reaction were investigated using optical microscopy and scanning electron microscopy combined with energy dispersive spectrometry. Both concrete samples taken from real object (bridges) and laboratory experimental specimens prepared according to ASTM C1260 dilatometrical method were used. Modal composition of studied samples was determined using petrographic image analysis of thin sections.

Alkali-silica reaction was demonstrated in both types of samples by presence of alkali-silica gels, cracks damaging the aggregates and by the aggregate boundaries attacked by cement paste. The monomineral quartz aggregates, quartzite, greywacke, metagreywacke and volcanic rock fragments reacted in cement paste and the alkali-silica gels were observed on their contacts. Other alkali-silica gels fill pores and cement paste. Cracks, partially filled by alkali-silica gels, are mainly concentrated at aggregate-cement boundary or intrude from aggregate-cement boundary to aggregate interior. Cement paste attacked the aggregate boundaries and formed embayment formations intruding into aggregates interior.

The volume of alkali-silica gels was higher in experimental specimens than in concrete samples. Cracks damaging the aggregates are more intensive in concrete samples. Time factor, cement paste composition and accelerating conditions are concluded as the main factors affecting the ASR.