

### **Study on Cracks in Concrete Structures in Cold Climates with Temperature Gradient**

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The investigation of the cores collected from the reinforced concrete structures with cracks on the lower surface and in the inner part of the structures in the cold climates showed that the collected concrete cores had low air content and low freeze/thaw resistance. The deterioration mechanism of the concrete in the freezing and thawing environment was examined with a rectangular parallelepiped specimen of concrete, in which the moisture was supplied to the upper surface and the rebars were inserted into the lower part. The results showed that the cracks were caused by a synergistic effect due to the expansion strain caused by the freeze-thaw action and the strain due to the temperature gradient of the upper and lower surfaces of the specimen.