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## Study on Effect of Deicer on the Durability (Freezing Thawing Resistance) of Concrete

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### Summary

From a viewpoint of environmental impact reduction, attentions have gathered for use of blended cement to concrete and deicing chemicals for controlling steel corrosion, these are actually beginning to be used. In this research, the difference of scaling degradation by the kind of cement and deicing chemicals was arranged. Furthermore, experimental study which paid its attention to the difference of the strain accompanying a temperature reduction with ice and concrete surface about the cause by which the grades of these scaling differ was performed. From these results, the elucidation of the scaling degradation mechanism by deicing chemicals was attempted.

Ordinary portland cement, fly ash cement, and blast furnace cement were used for cement. Moreover, chloride sodium, calcium chloride, potassium acetate and calcium magnesium acetate were used for the deicing chemicals.

On the mortar specimens, Solution of 3 mass % of deicing chemical was poured out so that it might become a depth of 1 cm. Freezing-thawing test of these mortars was carried out by use of freezer. After separating the piece of mortar removed through filter paper, the amount of scaling was dried for one day by a drier, and scaling ratio ( $\text{g}/\text{cm}^2$ ) is determined by the amount of scaling / cross-section area of specimens.

The strain of the ice and the mortar surface was measured under the same conditions as a freezing and thawing test with the strain gauge, respectively. Moreover, it searches for the shear strength on ice and the surface of mortar, and the grade of the bond was estimated.

Reference mortar dipped in water without deicing chemical has lowest scaling ratio. The scaling ratio in sodium chloride solution and potassium acetate solution increases rapidly. On the other hand, it is thought that calcium magnesium acetate cannot cause scaling of concrete easily. When its attention was paid to the kind of cement, it became clear that the quantity and transition of scaling could be explained by hydration of cement and admixture mineral. With change of the kind of deicing agent, the amounts of scaling differ greatly. These causes were considered that the strain difference of the border plane between the concrete and the ice due to a temperature reduction.