STUDY ON QUANTITATIVE ESTIMATION OF AEROSOL CHLORIDES CONDITION

Tatsuhiko SAEKI, Dr. (Niigata University)
Mitsuaki TAKEDA (Niigata University)
Kenji SASAKI, Dr. (Nagasaki University)
Tsuyoshi SHIMA (Sumitomo Osaka Cement Co., Ltd)

The purpose of this study is to estimate aerosol chloride conditions and the relation between environmental conditions and chloride penetration into concrete. Aerosol chloride concentrations were measured and long- and short-term concrete exposure tests were performed at several locations in Japan.

The work confirms that aerosol chloride concentrations transported by seasonal winds are almost the same every year at a certain location, as shown in **Figure 1**. Aerosol chloride concentrations and the penetration of chlorides into mortar specimens were measured at the same location. For mortar specimens with the same mix proportion, the relationship between cumulative chloride exposure and chloride penetration into specimens is the same, as shown in **Figure 2**. That is, chloride penetration into a concrete structure can be predicted from the chloride penetration into a mortar specimen exposed at the same location. The ratio of penetrated chloride concentration between concrete specimens with different mix proportions can be estimated from the diffusion coefficients of the two types of concrete under the same environmental conditions, as shown in **Figure 3**.

Based on these results, a prediction method for chloride penetration and the chloride concentration profile in concrete exposed to aerosol chlorides is discussed. In this method, the prediction is based on the chloride penetration into a thin-plate mortar specimen after short-term exposure, the diffusion coefficient ratio and chloride binding capacity.

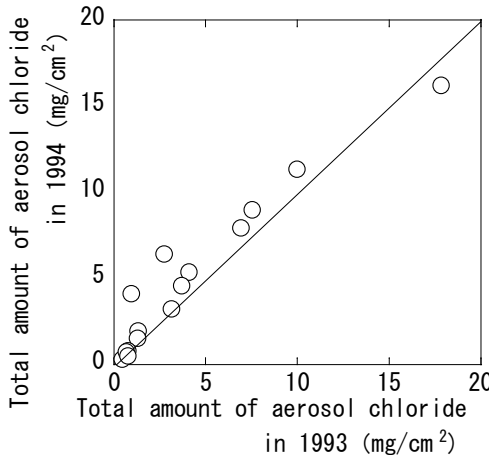

Fig.1 Total amount of aerosol chlorides in 1993 and 1994

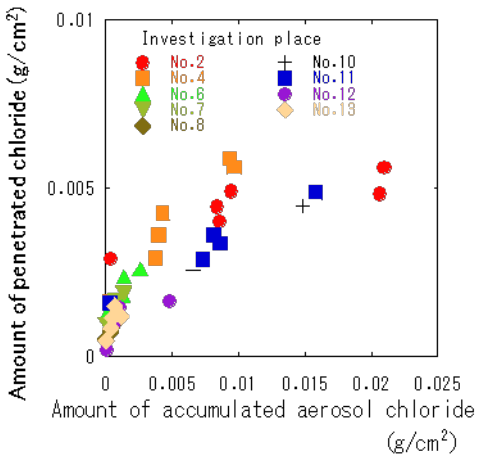

Fig.2 Relation between cumulative aerosol chloride exposure and chloride ion penetration into mortar specimen.

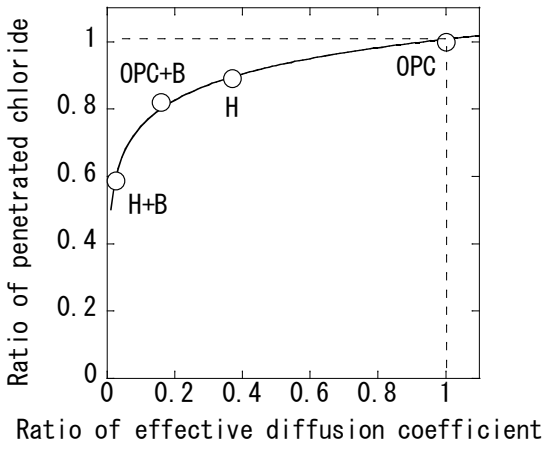

Fig.3 Effect of diffusion coefficient on profile chloride penetration

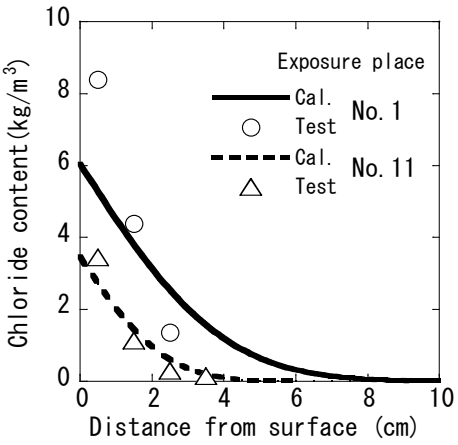

Fig.4 Predicted chloride concentration in concrete