PROPOSAL OF MONITORING METHOD FOR CHLORIDE INDUCED CORROSION IN CONCRETE BASED ON ENVIRONMENTAL DEPENDENCY OF SPECIFIC CONCRETE RESISTANCE

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There have been a number of investigations related to evaluating the quality of concrete using specific concrete resistance. In these evaluations, the influence of temperature or water content on specific resistance is formulated through experiments. Corrections for these variations are then applied when performing evaluations of concrete quality. On the other hand, specific concrete resistance readily varies with environmental factors such as temperature and wet-dry condition. A review of the literature and of pre-investigation data has shown that such dependencies might be applicable to understanding the progress of chloride attack in concrete structures. In this study, variations in specific concrete resistance resulting from this environmental dependence are investigated as a possible means to evaluate chloride attack in reinforced concrete as shown in **Figure 1**. From the investigations, a monitoring method for chloride-induced corrosion in concrete is proposed.

The research flow of present study is shown in **Figure 2**. In developing the proposal, evaluation methods and deterioration indexes for (1) the increase in chloride ion concentration around steel reinforcing bars, (2) initiation of steel bar corrosion, and (3) initiation of cracking are investigated. First, changes in specific concrete resistance resulting from variations in temperature and wet-dry condition are clarified. In doing this, measurements of specific resistance are made around steel reinforcing bars and on the concrete surface. Then suitable measurement methods for specific concrete resistance are investigated. Second, the apparent activation energy and water evaporation ratio obtained by the Arrhenius theory and diffusion law are used as new deterioration indexes. The effectiveness of the proposed indexes against phenomena (1) to (3) is clarified. Finally, an actual application of the method to existing reinforced concrete is investigated using concrete specimens exposed to a marine environment.

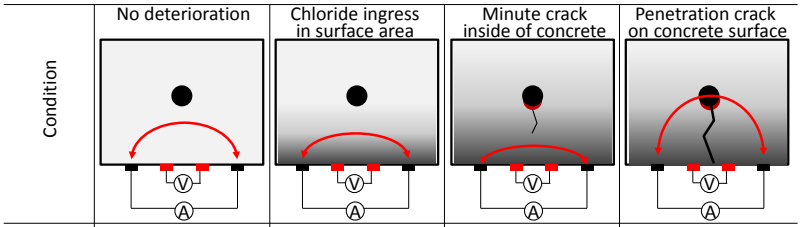

Figure1 Outline of Monitoring Method using Specific Resistance

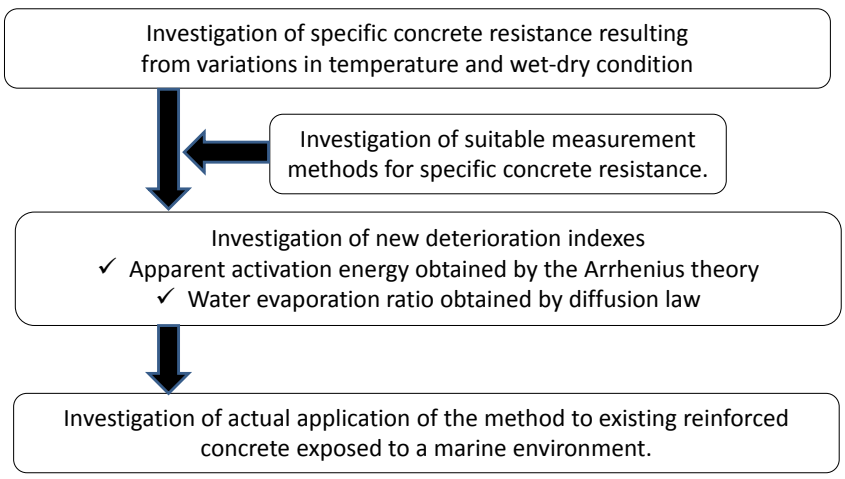

Figure 2 Research Flow of Present Study