



Influence of Environmental Variables on Chloride Ion Distribution on Concrete Surface under Dry-Wet Cycle

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Abstract:

In order to study the effect of environmental variables on the chloride concentration on the concrete surface under the action of drying and wetting cycles. Firstly, the influence of environmental variables such as monthly average temperature, monthly sunshine duration, and monthly rainfall on the dry-wet time ratio in Haikou and Wenchang was analyzed, and the dry-wet cycle mechanism of the Puqian Bridge was established. Then, according to the dry-wetting cycle mechanism, the influence of multiple factors on the distribution of chloride concentration on the surface was discussed, and a model of the chloride concentration distribution on the surface of unsaturated concrete under the action of multiple factors was established. Finally, the distribution model is compared with the experimental data in the literature to verify the rationality of the distribution model.

Keywords: environmental variables; concrete; surface chloride concentration; dry-wet time ratio.

1 Introduction

During the service period of seaside concrete structures, the corrosion of steel bars, concrete cracks and other durability deterioration phenomena occur. The main reason for this phenomenon is the penetration of chloride ions, which causes passivation of steel bars and leads to corrosion of steel bars [1].

Since the chloride concentration gradient between the concrete surface and the interior is the main driving force for the transfer of chloride ions from the externally exposed environment to the interior of the concrete. Therefore, it is great significance to

study the chloride concentration model of coastal concrete surface. Yang et al. [2] established a multi-factor model of chloride concentration on concrete surfaces in oceanic atmospheric regions based on two-stage multiple linear regression analysis. Akiyama et al. [3] established an empirical model for the distribution of chloride concentration on the concrete surface under multi-factor conditions based on field data. For the seaside concrete structure in the gradual wave area, due to the characteristics of alternating dry and wet in the gradual wave area, it naturally becomes the most serious area of harmful medium erosion, which seriously threatens the safety of the structure. Therefore, it is necessary to analyze the distribution law of chloride concentration on the surface of