・Maintenance and Management of Concrete Structures

Shinichiro Okazaki

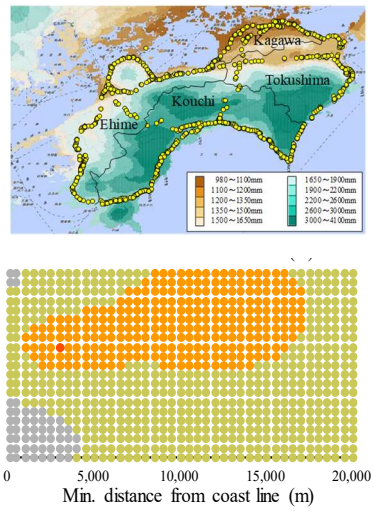
(Associate Professor, Faculty of Engineering, Faculty of Engineering and Design, Program in Architecture, Civil and Environmental Engineering, Dr. Eng.)

Email: okazaki.shinichiro@kagawa-u.ac.jp

Machine learning for durability assessment of reinforced concrete structures

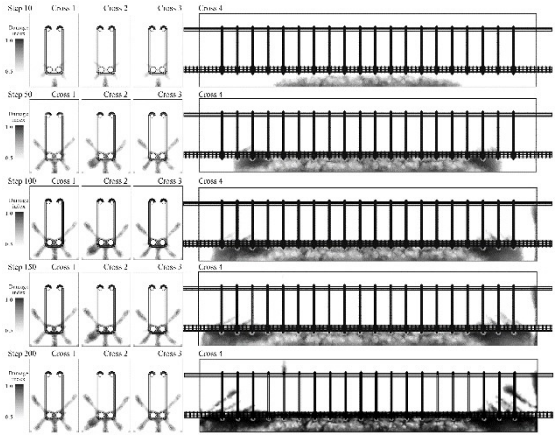
The growing demand for a more efficient maintenance of concrete bridges requires a model that tracks the deterioration of each bridge based on inspection data. Although it has been expected that machine learning could be applied to this problem, inspection data sparsely distributed over time are not suitable for machine learning in contrast to the continuous big data usually targeted.

This study applies machine learning to a regression model of crack formation and propagation using inspection data to confirm the applicability.



Corrosion simulation based on damage model

In Japan, the concrete structures (including those of port facilities) that were built during the intensive post-war construction period associated with high economic growth are now ageing remarkably. Such circumstances suggest a future increase in the number of associated services such as inspections and diagnoses, along with the development of laws and ordinances related to the maintenance and management of these structures. Using a finite-element scheme based on a damage model, a numerical system is developed to predict cracks in reinforced-concrete beams due to corrosion expansion.



Visualization of Chemical Composition and Chloride Ion Distribution by Novel NIR Imaging Spectroscopic System

Aging deterioration of reinforced concrete structures is mainly due to chemical reactions of rebar corrosion, carbonation, alkali-aggregate reaction, and the like, whereas collection of chemical information is effective to accurately grasp these signs. The recently introduced nondestructive measurement method of chloride ion concentration using a near-infrared (NIR) spectroscopy system detects an NIR peak of Friedel's salt that is immobilized on a concrete surface, followed by application of a multispectral method.