

## CRACK PROPAGATION DUE TO REBAR CORROSION AND NON-DESTRUCTIVE TESTS TO DETECT THE CRACK

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### **Abstract:**

Cracking of concrete due to rebar corrosion is a major source of deterioration of concrete structures. Such cracking typically accelerates the corrosion and deterioration processes, and can involve spalling of the concrete cover. It is necessary to assess internal damage from observable surface conditions during maintenance procedures. Therefore, it is desirable to establish the inspection and the prediction methods that can quantitatively evaluate internal cracks propagation behavior. It gives us maintenance strategy to achieve sustainable concrete structures.

Corrosion induced cracks of concrete have mainly been investigated by many researchers experimentally and analytically. There are many information related the cracks such as crack initiation, crack propagation, surface crack width, internal crack pattern and so on. Although, the behaviors are influenced many factors such as geometrical conditions and corrosion conditions, the relationships between many factors have not been evaluated clearly.

In the maintenance process, inspection is important and not only visual inspection but also non-destructive tests such as hammering method are required to detect internal crack which is useful to detect float or delamination of cover. Therefore, several evaluation methods have been proposed based on acoustic wave and electromagnetic wave.

This lecture presents about cracking behavior at surface and in concrete affected by several geometrical and corrosion conditions with an advanced numerical method, which is the Rigid Body Spring Method (RBSM) combined with the local corrosion expansion mode. Moreover, new methods for application of hammering method and electromagnetic wave radar device as non-destructive tests to detect corrosion induced internal crack are presented. The feature of the hammering method is used as first screening method to detect defect area in which new indexes to decide sound area is introduced. The feature of utilization of electromagnetic wave radar is that self-organizing map (SOM) which is one of unsupervised machine learning is combined. The method is applicable to detect thinner width crack in concrete and corrosion of rebar.

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