

## Development of Electromagnetic Wave-Based Monitoring Technique for Concrete Deterioration

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### ABSTRACT

Among non-destructive testing methods in civil engineering, Ground Penetrating Radar (GPR) has been utilized to detect rebars embedded in reinforced concrete structures. In such applications, GPR generally operates in a 0.4-3GHz frequency range, allowing real-time measurements and analysis. However, GPR has limited to apply to evaluate the deterioration of concrete. In this study, we propose a method to monitor the internal deterioration of concrete by utilizing the characteristics of electromagnetic waves. The proposed method is possible to localize the deterioration of concrete based on B-Scan images. To verify the approach, numerical simulations using gprMax and experiments on a mock-up slab simulating internal deterioration were conducted. Based on the results, it was confirmed that the proposed internal deterioration monitoring technique enables to detection of the deterioration located above the rebars.

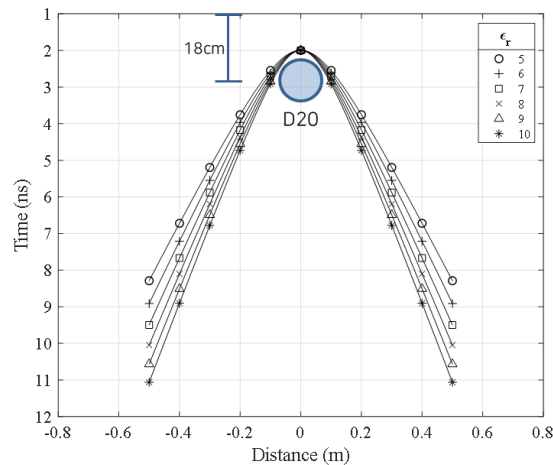


Fig. 1 Hyperbola shapes depending on dielectric permittivity of the material

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