



Application of non-contact sensing to concrete elements

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Recent developments in wireless and contactless testing hardware, such as internet of things and air-coupled ultrasonics, have enabled new levels of setting performance evaluation for concrete structures.

A fully contactless ultrasonic system has been developed using 8 channel MEMS units and wireless data transfer toolkit. Since surface preparation and direct coupling process are not needed, this system collects a large amount of test data across the field in a continuous manner. The measurements are carried out over concrete slabs, where the system monitors a low frequency vibration through shallow delamination-like defects. Densely obtained time-space domain data were transferred to frequency imaging map using spectrogram analysis, in order to identify the internal defects over the structures. The results illustrate that the developed system enables to acquire high-quality data and frequency imaging analysis possibly provides meaningful information of damaged-area without empirical correlation process. Based on the experiment and analytic study, appropriate applications of setting performance are suggested.

Keywords: Internet of Things; Wireless; Contactless; Impact-echo; Ultrasonics