

An Ultrasonic Signal Processing System for Tomographic Imaging of Reinforced Concrete Structures

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Abstract : This research article presents the integration of electronic and computer systems, which developed an ultrasonic signal processing system that performs the capture, adaptation, and analog-digital conversion to later carry out its processing and visualization. The capture and adaptation of the signal were carried out from the design and implementation of an analog electronic system distributed in stages: 1. Coupling of impedances; 2. Analog filter; 3. Signal amplifier. After the signal conditioning was carried out, the ultrasonic information was digitized using a digital microcontroller to carry out its respective processing. The digital processing of the signals was carried out in MATLAB software for the elaboration of A-Scan, B and D-Scan types of ultrasonic images. Then, advanced processing was performed using the SAFT technique to improve the resolution of the Scan-B-type images. Thus, the information from the ultrasonic images was displayed in a user interface developed in .Net with Visual Studio. For the validation of the system, ultrasonic signals were acquired, and in this way, the non-invasive inspection of the structures was carried out and thus able to identify the existing pathologies in them.

Keywords : acquisition, signal processing, ultrasound, SAFT, HMI

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