



Comparison of UPE and GPR systems for the survey of reinforced concrete structures

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The objective of this study is to compare two non-destructive techniques using sonic and radar pulses for the survey of reinforced concrete structures. The first studied testing method is a Ultrasonic (US) Pulse-Echo (model M2502, from Acoustic Control Systems manufacturer) composed of an array of 12 S-wave transmitters and 12 receivers in one bloc. Their central frequency is equal to 55 kHz. As the averaged US velocities in concrete tend to 1800-3000 m/s, the corresponding wavelengths tend to 3-5 cm. The Ground-penetrating radar (GPR) system has been performed with high frequency antennas above 1 GHz (1.5 and 2.6 GHz antennas), which lead to the same range of EM wavelengths than the US ones.

Measurements have been performed on some thick reinforced concrete elements of structures, and then are compared in term of resolution, depth penetration and ease to use. One of the studied elements is a concrete beam (dimensions : 16 m long, 0.5 m width and 1 m high) designed in an European Projet (FP7_ISTIMES) and damaged by controled impacts of blocks of several tons dropped from few meters [1]. Therefore, the objective of this study is to compare the two techniques, and for the last studied element to detect the major cracks and the spallings of the cover concrete which are visible from the opposite side.

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