

Experimental study on grouting inspection of PC tendons by means of Ultrasonic Pulse Echo Tomography method

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Evaluation of grouting condition of post-tensioned tendons in Prestressed Concrete (PC) structures is an important problem in a field of maintenance of civil engineering infrastructure. Existing methods of non-destructive testing (NDT) used for grouting inspection have some limitations. For example, Impact-Echo method has comparatively low accuracy and X-Ray method is expensive and time- and labor-consuming. At the same time, there are promising alternative methods of NDT, which can be used for grouting inspection. The authors carried out an experiment using several large-scale specimens simulating PC girders. Commercially available Ultrasonic Pulse Echo Tomography device with an array of dry-contact sensors was used. Several cases of grouting condition, PC sheath diameter and geometry and rebar placement were studied. It was confirmed that amplitude of reflected ultrasonic pulse in the case of not grouted PC sheath is larger, as compared with a case of a grouted PC sheath. However, depending on diameter of PC sheath, distance from PC sheath to concrete surface and presence of nearby reinforcement, evaluating grouting condition based only on amplitude of reflected ultrasonic pulse can be problematic. To solve this problem authors developed a more accurate method of evaluating grouting condition, which uses multiple parameters, such as amplitude of ultrasonic pulse reflected from PC sheath, backwall and phase of reflected ultrasonic pulse.