

# **Inside Damage Evaluation of The Dam by Elastic Wave Methods**

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Concrete dams are deteriorated by a combination of factors such as temperature stress, embankment materials, environmental effects, water flow, and accidental external forces. From the mechanism of occurrence and propagation of deterioration damage, cracks extending into the embankment should be paid special attention from the viewpoint of the stability of concrete dams. However, visual inspection and core borehole investigations are mainly used to investigate cracks, and it is difficult to understand the distribution of cracks extending into the interior of the dam using these methods. In this study, P-wave velocity tomography and Rayleigh wave velocity tomography based on wavelet transform were applied to cracks on the horizontal joint surface of a concrete dam embankment. Rayleigh wave velocity tomography based on wavelet transform allows for frequency-by-frequency analysis of excited elastic waves. These results are in a reasonable accordance with the results of the core borehole investigation. The present study enabled effective understanding of the distribution of crack extension, which had been difficult with conventional investigation methods. Therefore, it will be possible to evaluate the integrity of concrete dams more efficiently by applying this method to cracks that can be visually confirmed, and by conducting core borehole investigations after determining the depth and extent of crack growth.