



Seismic investigation of an embankment dam using P and Rayleigh waves

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P and Rayleigh waves were recorded in a 240-m seismic profile to define the internal structure of an embankment dam of Daeryong Reservoir in Korea. These waves were generated with a 5-kg sledgehammer and were recorded with an OYO-McSeis-SX engineering seismograph using twenty-four 4.5-Hz vertical-axis geophones spaced at 3-m intervals. The seismic waves were recorded along the length of the 24 m high earth-fill dam, which is approximately 6 m wide at its top. P- and S-wave velocities of the dam body were obtained using first-arrival traveltimes tomography and Multichannel Analysis of Surface Waves (MASW) methods, respectively. The velocity tomogram derived from direct and critically refracted waves indicated that P-wave velocities increase with depth from 300 to 600 m/s in the top 4 m of the dam above the impounded water level, to 600-1400 m/s in the 4-24 m depth range, to 1800 m/s at the base of the dam. The S-wave section also shows apparent layering within the clay core of the dam at a depth interval of 4-24 m. Dynamic Poisson's ratios are higher in the core body at a depth of about 10 m. Lower S-wave velocities are also indicated near places where leakage is observed at the surface of the dam slope. Seismic surveys using both P and Rayleigh waves may be applied to obtain the gross physical properties of the dam and to detect anomalous zones that correspond to weaker portions of the dam.