



## Development of a nuclear magnetic resonance (NMR) surface scanner

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### 【Outline】

We have developed a prototype scanner capable of nondestructive, in-situ measurement of water content in cracks in concrete structures.

### 【Details】

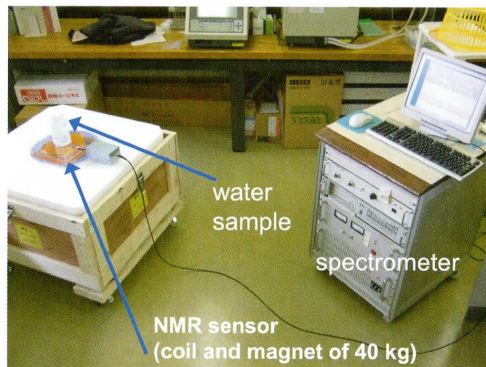
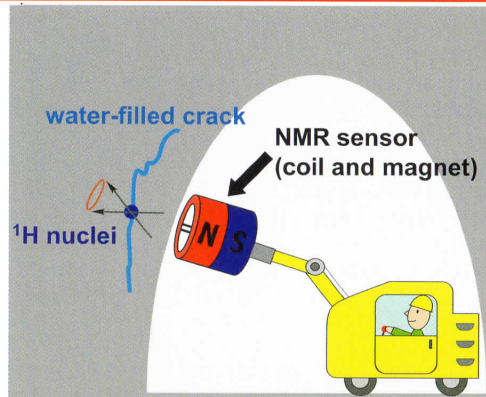
The need to maintain aging tunnels, dams, and other concrete structures to prevent geotechnical disasters calls for a means of nondestructive, in-situ measurement of cracks and other weaknesses that contain water. To address such needs, the Exploration Geophysics Research Group is developing a device that uses nuclear magnetic resonance (NMR) spectroscopy to target hydrogen nuclei, one of the few available geophysical exploration methods of measuring water quantity. A surface scanner based on the NMR principle has the potential to enable the non-destructive, in-situ, real-time measurement of the quantity of water in cracks within concrete structures or rock formations. The prototype developed by the Group is capable of detecting the NMR signal of a water sample separated by a distance of 5 cm from the sensor surface within about 5 minutes.

### 【Applications】

If the current prototype is developed through improving the configuration of the high-frequency coil and rare earth magnet and through making the device waterproof and dustproof, it could be put to practical use as a civil engineering geophysical exploration system.

### 【Joint researcher】

Shin Utsuzawa (New Mexico Resonance; Visiting researcher, AIST)



(top) Diagram showing how an NMR sensor might be used to inspect a tunnel for cracks  
(bottom) The prototype NMR surface scanner