

Pore pressure change observed using closed borehole well and determination of poroelastic parameters

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We obtained broadband pore pressure change of rock mass using borehole wells by closing it at wellhead to keep undrained condition under which there is no flow of water through the screen of the well. The wellbore storage effect, which induces a high-cut response to the well-aquifer system and is unavoidable for open wells, was effectively removed by closing the borehole and keeping undrained condition. Our closed borehole well at the Mozumi observation tunnel of Kamioka Mine, central Japan, detected not only the phases corresponding to seismic body waves but also free oscillations of the Earth. We determined in situ value of pore pressure sensitivity to areal strain, or loading efficiency, as 0.43 - 0.60. Shear modulus is determined to be larger from the borehole drilled away from the fault crushed zone than that from the borehole drilled in the fault crushed zone. We also determined hydraulic diffusivity as $0.1 \text{ m}^2/\text{s}$, which is consistent with the value determined by core measurement.