Repeated Water Injection Experiments at the Nojima Fault - Self-potential measurement result in 2004 -

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The Nojima Fault Zone Probe was designed to study the properties and recovery processes of the Nojima fault, which is the surface fault rupture of the Hyogo-ken Nanbu earthquake (M7.2) of 1995. In this project, water injection experiments were conducted in 1997, 2000, 2003 and 2004. We observed self-potential variations to investigate the magnitude of electrokinetic and hydraulic parameters around the Nojima fault zone. In the 2004 experiment, self-potential variations in the range of a few to about 80mV across 3-40m electrode dipoles with hydraulic pressure 4.5MPa and flow rate 15.5l/min. These observed self-potential variations can be explained well with an electrokinetic effect due to the underground flow of the injection water. From the observed results, we estimated that the ratio of hydraulic parameters (permeability, porosity, and tortuosity) to electrokinetic parameters (zeta potential and dielectric constant) decreased from 0.00060 in the 2003 experiment to 0.00032. This suggests that the hydraulic parameters decreased and the recovery processes around the Nojima fault progress.