

3D ERT time-lapse monitoring during levee overflow simulation using multi-current transmission technique

*Yamashita Yoshihiro¹, Tsuyoshi Kobayashi¹, Hideki Saito¹, Toshio Sugii², Takeshi Kodaka³, Kenichi Maeda⁴, Ying Cui⁵

1. OYO Corporation, 2. Chubu University, 3. Meijo University, 4. Nagoya Institute of Technology, 5. Yokohama National University

We conducted a field experiment to simulate levee overflowing using a small model bank and made 3D ERT monitoring on this levee. We built a scale model bank and water pool for simulating water level rising at river levee and overflowing. We also set equipment for artificial rainfall above the model levee. As one of monitoring measurements while rising water level and overflowing, we conducted time-lapse ERT measurement on this model bank for the purpose of capturing water infiltration inside the model bank. We applied multi-current transmission technique to realize finer time resolution of ERT measurement for capturing water infiltration through high permeable material. In this technique, we can inject current at plural current electrodes simultaneously. By using our instrument based on this technique, which has 8 transmitters and 8 receivers, we can improve measurement efficiency. We conducted a set of measurement which has 3072 data at the interval of 20 minutes. We performed 2D and 3D resistivity inversion. ERT measurement captured the water infiltration into the model bank by fine time resolution. The brackish saline water worked as a good tracer of ERT measurement in this case. 3D inversion using 2D survey lines data contributed to understand the spatial distribution of resistivity time variation.

Keywords: resistivity, levee overflow, monitoring