

Application of a non-destructive DC electrical survey to a river embankment

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Electrical survey methods without the insertion of electrodes into the ground surface have been developed as simple and efficient survey methods. One of them is an alternating current electrical survey method using a roller-type polyvinyl alcohol (PVA) sponge as a non-destructive electrode. However, it was pointed out that this method has a problem in performing the surveys of deeper targets comparing the direct current (DC) electrical survey because the apparent resistivity decreases with increase of depths due to the skin effect caused by the high frequency of 20 kHz. Since the PVA sponge electrode is conductive different from the capacitor electrode which one of the most typical non-destructive electrodes, it is considered that it can be used for DC resistivity survey. Comparison with the results obtained with the PVA electrodes and by the conventional method using stainless steel electrodes revealed that both results were almost the same. Therefore, a DC electrical survey using roller-type PVA sponge electrodes was conducted on a river embankment as an application experiment.

In this study, the measurement was carried out with a survey line of about 500 m on the left embankment of the Miyato river in Koga City, Ibaraki Prefecture. A part of the embankment on the survey line was damaged by heavy rain in September 2015 and October 2017, and the geological structure was estimated by a boring survey. The resistivity structure of the river embankment determined by inversion were used with the boring results for the discussion on the relation between the soil type and resistivity of the embankment.

Keywords: resistivity, electrical survey, roller-type electrode, river embankment