DEVELOPMENT OF INTEGRATED GEOPHYSICAL INVESTIGATION TECHNIQUE FOR VULNERABILITY ASSESSMENT OF LEVEE

Abstract : Geophysical investigation is expected to play an important role in the vulnerability assessment of levee, because the conventional visual inspection and spot drilling technique is inadequate to detect internal anomalies of levee. Indeed, internal heterogeneity of levee body and substrata has been rarely taken into account in the conventional safety assessment of levee systems, whereas the structural heterogeneity or the anomaly of physical properties is thought to be one of the major vulnerability factors of the levees. It was mainly because of the difficulty in imaging levee body as well as substrata at low cost but with high performance. It has been therefore required to develop an effective, inexpensive and easy-to-apply field survey method which enables to delineate the internal structure of levee systems continuously. We then tested several geophysical methods at actual levees, and confirmed the advantages of the following methods through the field work, in the viewpoints of cost effectiveness and their capability in detecting anomalies. The geophysical techniques consist of surface wave method using Land Streamer, capacitively-coupled resistivity method using OhmMapper, and supplemental multi-frequency electromagnetic survey method. Field tests showed that anomaly structure in and beneath the levee systems was successfully identified by means of the combination of above methods.

Key words : river levees, vulnerability assessment, integrated geophysical investigation, capacitively coupled resistivity method, surface wave method, resistivity, S-wave velocity.