Application Research on Resistivity Imaging Method in Detecting Hidden Leakage Trouble of Hardening Dam Surface

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Abstract: Dam surface concrete structure causes certain interference on current transmission path. In order to improve the reliability of electric imaging technology in finding leakage passage, the influence characteristics of three kinds of surface layers on electrical resistivity distribution of dam under complicated environment was studied. Typical dam geoelectric models of hardening layer- bam body soil, water body-hardening layer - dam body soil and water body- hardening layer - dam body soil were established. The positive inversion numerical calculation was conducted through the finite element method. And then, the effectiveness of detecting the dam through resistivity was discussed. Besides, by combining with the analogue simulation of homogeneous dam hidden dangers, the interference features of thickness of hardening layer, the thickness of the water body on the hazard identification were further accessed. According to the numerical simulation results, hardening layer and water body caused the distortion in electric field propagation path, and brought interference for dam resistivity detection; with the increase of the thickness, the sensitivity of effective signal reduced more obviously, and water body exerted more influence on the result than the hardening layer; based on the comparison of homogeneous dam hidden trouble simulation results, water body - hardening layer - dam body soil conditions, to a certain extent reduced the effective identification of leakage hidden information. Finally, with the combination of the engineering cases, better testing results could be achieved by reasonably optimizing the arrangement of the test system and improving the processing and interpretation methods. The research provide powerful guidance for the field detection construction.

Key words: Resistivity Imaging, Hidden Danger, Hardening of Dam Surface, Numerical Simulation

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