

عنوان مقاله:

uncertainty in steady state seepage analysis of embankment dams

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خلاصه مقاله:

Seepage analysis is one of the most substantial stages in the design process of an embankment dam. Despite numerous advances in theoretical formulations and experimental issues on water seepage through embankment dams, the validity of seepage analysis results are to much extent dependent on a number of factors such as simplification in modeling of dam geometry, material non-homogeneity, construction quality of the designed members and uncertainty in material properties. The degree of dependency of the seepage analysis results on the affecting factors is still unknown and few reference documents in this respect are at hand. A number of sensitivity analyses on these issues can reveal the degree of dependency of results obtained from the seepage analysis on the variation of the aforementioned sources of errors. In this paper several steady state seepage analyses for a real three dimensional site modeling of an embankment dam is performed. The uncertainties related to the material properties of various zones of embankment dam, foundations and abutments, depth and hydraulic permeability of grouting curtains and etc.; were evaluated using three dimensional FEM. A two dimensional steady state seepage analysis of the dam is also performed and the results relating to simplification in model geometry on discharge rate, phreatic surface and hydraulic gradients is compared to those of three dimensional ones. The results of the sensitivity analyses show relative changes of the downstream water surface, hydraulic gradients and water discharge rates according to changes in hydraulic conductivity of various zones and depth of grouting curtains. In addition, for the narrow valleys three-dimension steady state seepage analysis indicates higher values for the downstream water surface and hydraulic gradient of downstream toe with respect to those obtained from conventional two-dimensional analysis for the maximum height section.

کلمات کلیدی:

Embankment dam, Uncertainty, Steady state seepage, Sensitivity analysis, FEM

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