IMPACT OF SOIL FORMATION ON SEEPAGE AND UPLIFT CHARACTERISTICS UNDERNEATH HYDRAULIC STRUCTURES

Eman A. Elnikhely, Walaa Y. El-Nashar

Abstract

Seepage underneath floors of hydraulic structures takes place due to the difference in water levels betwee upstream and the downstream sides. The analysis of seepage flow has is important for design applications structures. The present paper aims to study the effects of anisotropy of soil on the seepage characteristics media of a finite depth and extent. A two-dimensional steady –state saturated ground water flow model wa using the Z-Soil program to obtain the uplift pressure distribution under the floor of hydraulic structure of of one and two layer soil formation and the exit hydraulic gradient downstream the structure. For a one- la the variables investigated are the degree of anisotropy and the effects of macro-heterogeneity by using iso permeable pockets or extent of a permeable formation within the soil domain. For a two-layer system with layer more permeable than the upper one, the effect of the upper layer thickness, the effect of anisotropic ratios of the semi-pervious top stratum (silty-sand), the effect of anisotropic permeability ratios of the per stratum of sand, and the effect of anisotropy ratio of both stratum were examined. Dimensionless graphs seepage characteristics are provided. The results of the Z-Soil program are verified using finite element pr other and conformal mapping method (CMM) [6]. It is found that the use of the two-dimensional finite ele that was implemented by the computer program Z-Soil provided a convenient analysis tool that allowed th irregular site conditions