ABSTRACT

Investigation of two dimensional steady as well as unsteady seepage through an earth dam is carried out using the finite element method. Three noded , six noded and a mixture of three and six noded triangular elements are employed. Special procedure is suggested to alleviate convergence problems at the singular point at the intersection of free surface with the seepage face. The model is used to study a variety of seepage problems such as anisotropic conditions, zoning with various core shapes and material properties etc. In addition two special cases are studied. In the first case effect of thin impermeable walls in place of conventional core is investigated. The second case involves introduction of a filtration drain in the middle of the dam to ensure safety. Stress and stability analysis of the dam are carried out by finite element method. Based on the stress and seepage analysis, a local factor of safety is defined to obtain a global picture for the stability analysis. A new factor of safety is introduced which is the lower bound for its classical counterpart. A cost function based on safety, quantity of seepage and cost has been defined to compare performance of different designs. Definition for factor of safety for stability of slope is

suggested and failure surface is predicted.

Key Words : steady free surface, transient free surface , seepage, earth dam, slope stability, factor of safety, cost function, finite element method .