International Journal of Civil and Structural Engineering Research ISSN 2348-7607 (Online)
Vol. 4, Issue 1, pp: (342-346), Month: April 2016 - September 2016, Available at: www.researchpublish.com

SEEPAGE ANALYSIS AND SEISMIC BEHAVIOUR OF EARTH FILL DAM USING GEO-STUDIO

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***Abstract*: Seepage analysis is very important to ascertain the stability of structure or seepage itself. The stability of seepage depends upon on its geometry, its components, material properties of each component and the forces to which it is subjected. The methodology and assumption implicated by various analyzing techniques regarding the seepage sustainability investigation on soil embankment are considered and their characteristics are listed. The principles involved and equation to compute the stability or amount of flow taken place in embankment dam. The consideration of these data are also studied in order to select a suitable method using finite element method Geo-studio SEEP/W for the seepage analysis that satisfies almost all the conditions and given the more accurate results. Seismic performance is one of the most important issues for homogeneous earth fill dam which are constructed in regions that height, slope angle and amplitude of input motion on the peak crest acceleration. The present works deals with an important and complex issue in geotechnical and earthquake engineering. This concerns the influence of both elasticity and pore- water pressure on the seismic response of earthen dams to artificial earthquake records using finite element software QUAKE/W in Geo studio.**

Keywords: **Seepage, Seismic performances, Earthen dam, Geo-studio, Earthquake.**

1. INTRODUCTION

Dams must be composed and kept up to securely control drainage. By the by, most dams involvement with minimum some leakage and numerous experience the ill effects of over the top drainage. Unnecessary leakage may prompt issue with the wellbeing of a dam if not treated correctly. The essential issue is attempting to observe how leakage is influencing a specific dam and what measures, assuming any, must be taken to guarantee that the drainage does not antagonistically influence the security of the dam. You may need to survey foundation data on geologic qualities, development particulars and records, and wellbeing and review records to observe basic data relating to seepage. On the off chance that a leakage issue has as of now been distinguished you might be solicited to decide the responsible justification from the drainage and the healing activity required.

An Earthquake is a sudden tremor or development of Earth's crust, which beings actually at or beneath the surface. The word normal is imperative here, since it bars stun waves created by atomic test, man- made blasts. And so forth. Around 90% of all quakes result from Tectonic occasions, primary developments on the issues and so on. The remaining is identified with volcanism, breakdown of subterranean holes or man-made impact.

Earthquakes occur almost every day all over the world. Most of the time earthquakes are not strong enough to be felt by people, but the shaking caused by an earthquake can be recorded by a seismometer. These machines are located all over the world to ensure detection of earthquakes of all strengths.

2. OBJECTIVES

The first objective of this investigation is to study the seepage analysis of earthen dam and to find out the amount of flow crossing the section of embankment of earthen dam using finite element software SEEP/W.

The second objective of this investigation is to study the seismic behavior of homogenous earthen dam by using a finite element software QUAKE/W. The QUAKE/W is a geotechnical limited component programming utilized for the dynamic examination of earth dam subjected to seismic tremor shaking and other sudden effect stacking, for example, dynamiting or heap driving. The study incorporates the examination to research of the ground and the structure when it is subjected to a seismic tremor, and to look at the likelihood that there might be some era of overabundance pore-pressure, which thus could prompt some liquefaction

3. METHODOLOGY

- Define view to setup model
- Solve manager to compute the results
- Results view to view the numerical solution

Solution for a typical problem:

Problem-1 Configuration: The below figure shows the problem configuration of a homogeneous earth dam with mesh. The embankment is 17m high with Upstream slope 3H: 1V Downstream side slopes 2h:1V. The dam retains a reservoir with a full supply level (FSL) at an elevation of 15 m with a water head of 2 meters. The properties of the materials considered for the study is shown in Table.

TABLE.1

Parameter		**Embankment material**	**unit**
Material mode	Saturated/unsaturated		
Hydraulic conductivity	Embankment conductivity	Saturated Kx= 1e-009	m/sec
		Residual water content= 0.07	M^3/m^3
Volumetric water content	Silt water content function	Saturated WC= 0.6	M^3/m^3
		Sample material=silt	

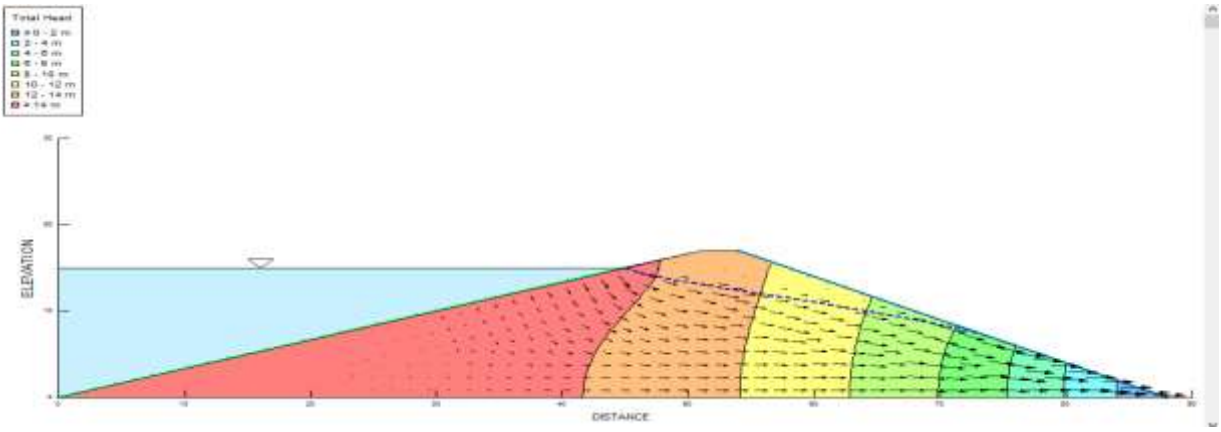

Fig.1: Result view of total head contour

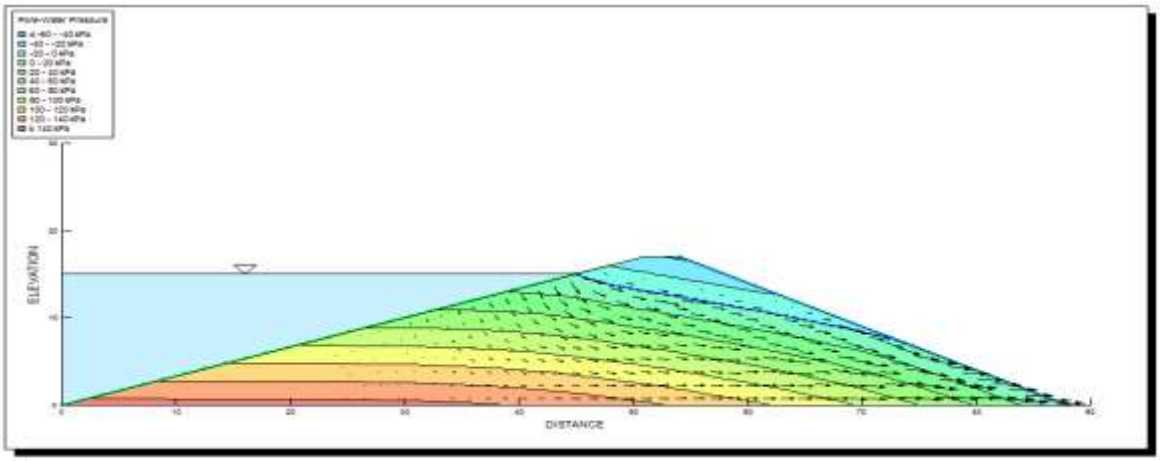

Fig.2: Result view of pore water pressure

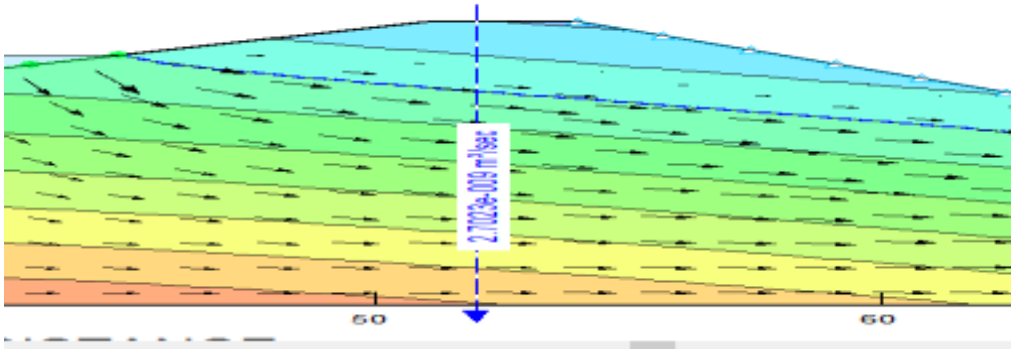

Fig.3 Flux section

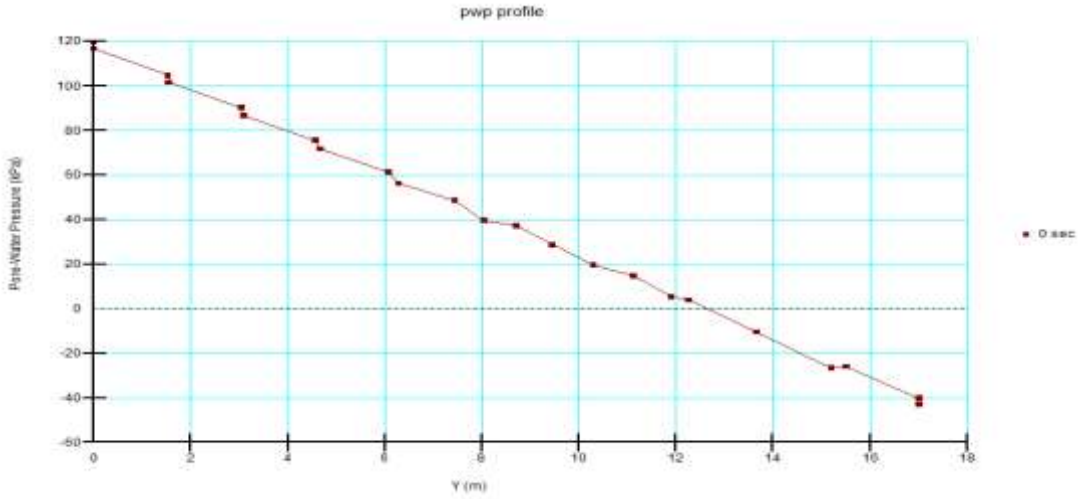

Fig.4 Graph of pore water pressure profile at middle section of embankment

Problem-2 Configuration: The below figure shows the problem configuration of a homogeneous earth dam with mesh. The embankment is 17m high with Upstream slope 3H: 1V .Downstream side slopes 2h:1V. The dam retains a reservoir with a full supply level (FSL) at an elevation of 15 m with a water head of 2 meters. The properties of the materials considered for the study is shown in Table

TABLE.2

Parameter	**Unit**	**Dam material**
Unit Weight (γ)	KN/m³	20
Poisson's Ratio (ν)		0.3
Damping Ratio (ξ)		0.1
Shear Modulus (Gmax)	Mpa	5000

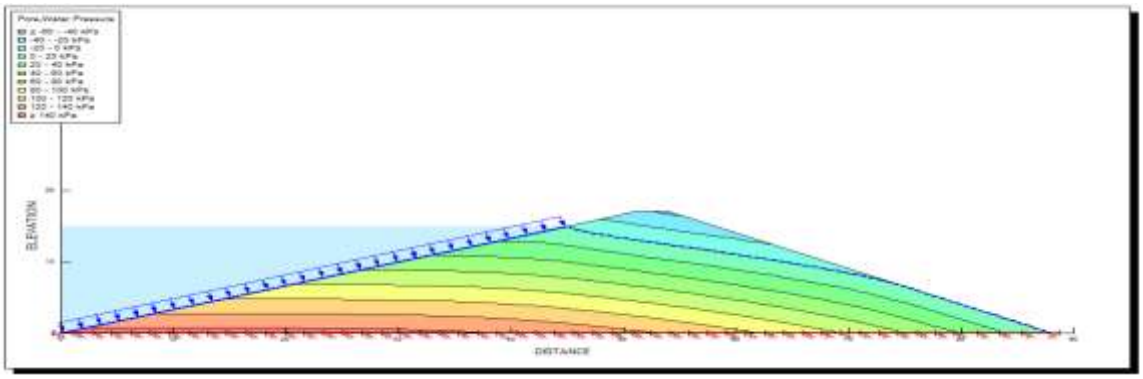

Fig.5: Pore Water Pressure

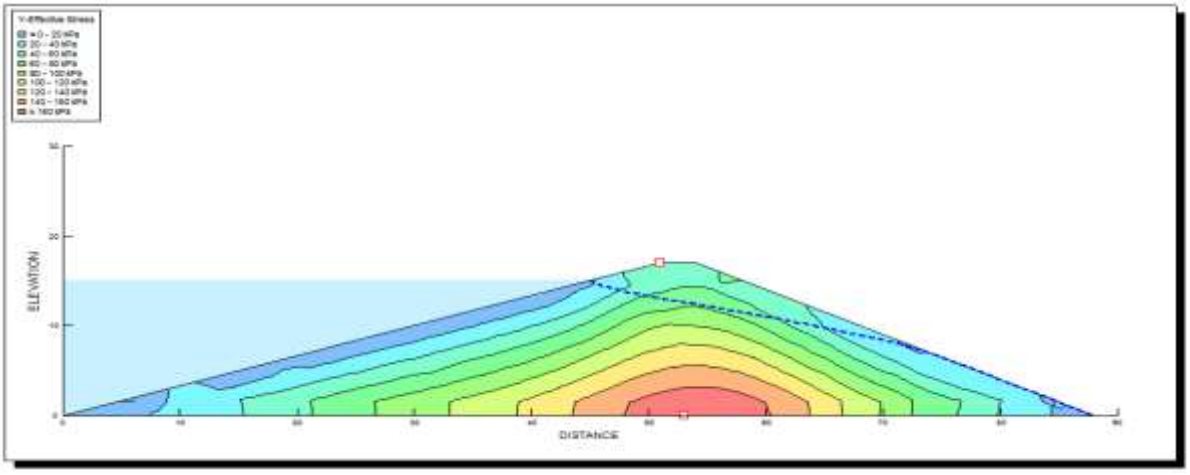

Fig.6: VERTICAL EFFECTIVE STRESS

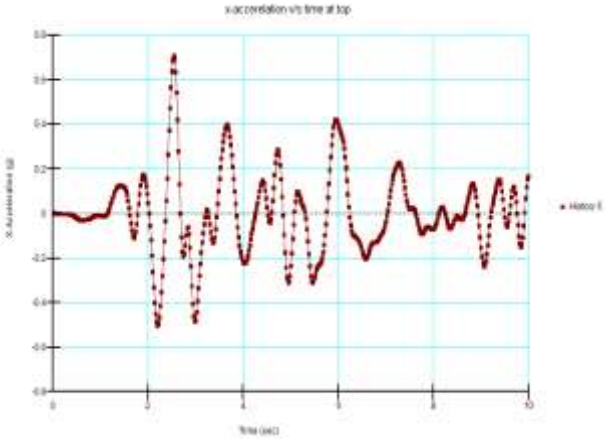

Fig.7 : Graph of accerelation at the crest or top of embankment

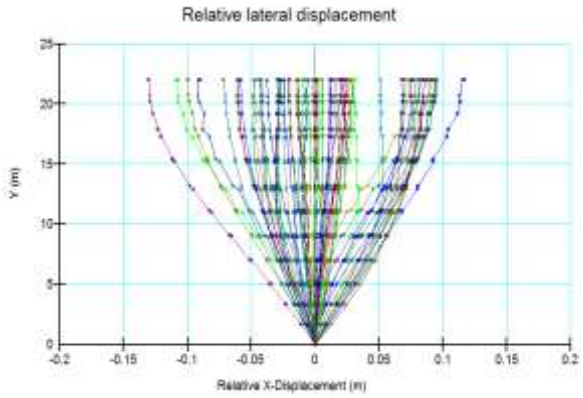

Fig.8: Relative lateral displacements

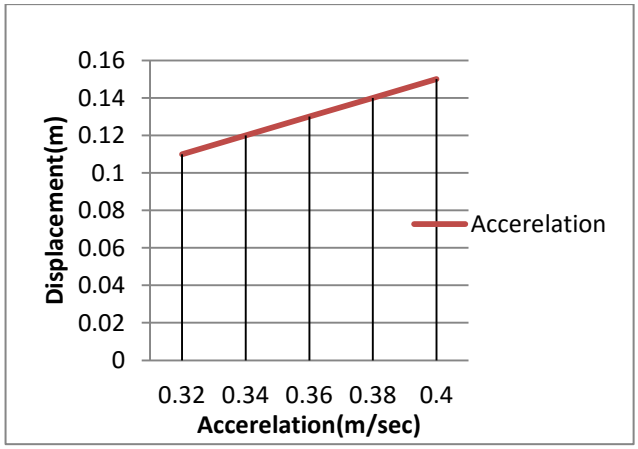

Fig.9: Graph of Acceleration v/s Displacement

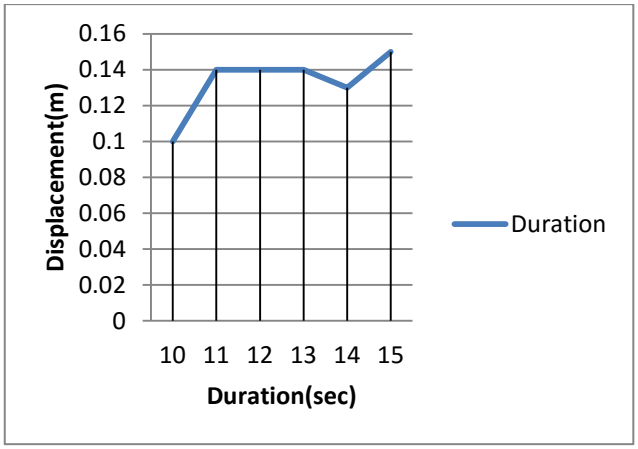

Fig.10: Graph of Duration v/s Displacement

4. CONCLUSION

1. In the present study, utilizing the geo-slope software seepage and stability investigation in ramanahalli earth fill dam is examined SEEP/W software is utilized for seepage analysis. Four lattice size properties for example coarse, medium, fine and unstructed cross section is assess to evaluate the type and size of mesh on the total flow rate and total head through the dam cross section. Result showed that average flow rate of seepage under the mesh size of 1.5m for ramanahalli dam equal 2.9e-009m^3 /sec for middle of dam

2. The ground response analysis has been carried out on the ramanahalli dam by subjecting four different parameters studies, the behavior of soil layer under different earthquake excitation and obtained the surface acceleration of respective earthquakes, static, dynamic, seepage and liquefaction analysis has carried out using QUAKE/W software.

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