

DEFORMATION BEHAVIOUR OF A CLAY CORED ROCKFILL DAM IN  
TURKEY

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## **ABSTRACT**

### **DEFORMATION BEHAVIOR OF A CLAY CORED ROCKFILL DAM IN TURKEY**

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In this study, Bahçelik Dam, which is located in Kayseri Province, is investigated by means of horizontal movement due to reservoir loading and seepage inside the core and body. Two dimensional plain strain finite element analyses are carried out in order to find total stresses, displacements and pore water pressures. Mohr-coulomb soil model is used to represent elastic behavior of rock-fill material. Since there is no information about material used in dam body, material parameters are determined by sensitivity analyses being in the range of data acquired from literature survey. Calculated displacement and pore water pressures are compared to the data taken from field survey on actual dam body. As a conclusion remark, it is believed that the horizontal displacement behaviour of two systems, such as real dam and computer modelling, would not match exactly since the materials used in real dam body would behave as plastic whereas that used in computer modelling assumed to be elastic.

**Keywords:**Rockfill dam, Bahçelik dam, clay cored dam, finite element, deformation, seismic performance

## ÖZ

### **TÜRKİYEDE BULUNAN KİL MERKEZLİ KAYA DOLGU BİR BARAJIN DEFORMASYON DAVRANIŞI**

Oral, Yaşar Zahit

Yüksek Lisans, İnşaat Mühendisliği Bölümü

Tez Yöneticisi: Yrd. Doç. Dr. Nejan Huvaj Sarıhan

Aralık 2010,97 sayfa

Bu çalışmada, Kayseri ili içerisinde bulunan Bahçelik Barajı, rezervuar etkisinde oluşan yatay deplasman ve baraj gövdesinde ve çekirdeğinde oluşan sızıntılar yönünden incelenmiştir. Toplam gerilme, deplasman ve boşluk suyu basıncını temin etmek için iki boyutlu düzlem şekil değiştirme metodu kullanılarak sonlu elemanlar metodu analizi yapılmıştır. Kaya dolgunun elastik yapısını temsil etmesi için Mohr-Coulomb zemin modeli kullanılmıştır. Baraj gövdesinde kullanılan malzemelerle ilgili bir bilgiye sahip olunmadığından, literatür araştırmasında elde edilen sınırlar içinde hassaslık analizleri yapılarak malzeme parametreleri belirlenmiştir. Saha incelemesinden elde edilmiş olan deplasman ve boşluk suyu basıncı değerleri sayısal modelden elde edilen değerler ile karşılaştırılmıştır. Sonuç olarak, gerçek baraj gövdesinde kullanılan malzemeler ile sayısal modellemede kullanılan malzemeler plastik ve elastik olarak iki farklı davranış sergileyeceğinden, analiz sonucunda çıkacak olan yatay deplasman eğrileri tam olarak çakışmayacağı düşünülmektedir.

**Anahtar Kelimeler:** Kaya dolgu baraj, Bahçelik barajı,Kil çekirdekli baraj, sonlu elemanlar, deformasyon, sismik performans

To my wife and my family

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## LIST OF ABBREVIATIONS

$a_{\max}$	Peak Horizontal Ground Surface Acceleration
$g$	Acceleration of Gravity
$\sigma_v$	Total Vertical Stress
$\sigma'_v$	Effective Vertical Stress
<b>FS</b>	Factor of Safety
<b>E</b>	Elastic Modulus
$\nu$	Poisson's Ratio
$\gamma$	Shear Strain
$\sigma$	Normal Stress
<b>k</b>	Seismic Coefficient