In The Name of God, The Compassionate, The Merciful

۹۹۱۲۱

Shiraz University
Faculty of Engineering

Ph.D. Dissertation In Civil Engineering

SHEAR MODULUS AND DAMPING RATIO OF MIXED GRAVEL AND CLAY

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July 2008

۹۹۱۳۱

دانشگاه شیراز

دانشکده مهندسی

پایان‌نامه دکتری در رشته مهندسی عمران (مکانیک خاک و پی)

ضریب برشی و نسبت میرایی برای خاکهای مخلوط شنی رسی

توسط

مه رشک میدانی

استاد راهنما:

دکتر ارسلان قهرمانی

دکتر قاسم حبیب آگهی

۱۳۸۷ /۷/ ۱۵

مرداد ماه ۱۳۸۷

۹۹۱۲۱

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THESIS

SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PH.D.)

IN

CIVIL ENGINEERING
(SOIL MECHANICS AND FOUNDATION ENGINEERING)
SHIRAZ UNIVERSITY
SHIRAZ
ISLAMIC REPUBLIC OF IRAN

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JULY 2008

Dedicated to My Beloved Parents.

Homa & Javad.

Acknowledgements

I would like to express my sincere thanks to my supervisors, Professor Arsalan Ghahramani and Professor Ghassem Habibagahi for their patient guidance throughout the period of my study in Shiraz University.

Cyclic triaxial tests were performed at the Advanced Soil Mechanics Laboratory of International Institute of Earthquake Engineering and Seismology (IIEES) in Iran. I would like to extend my deepest gratitude to my thesis advisors, Professor Mohammad Kazem Jafari and Dr. Ali Shafiee for granting unrestricted access to the laboratory resources and their fruitful discussions on my research details.

Special thanks to Eng. Mehdi Asgari, who helped me in setting up the triaxial devices in IIEES. I would like to thank Eng. Javad Jalili for developing the code for the analysis of raw data from the triaxial device. I also wish to thank other IIEES soil mechanics laboratory staff, Misters Mohammad-Kamran Shirazian, Shahriar Azadmanesh, Ebrahim Akbari, Saeed Yousefi and Ghassem Haadavi for their friendly cooperation during my stay in IIEES. The security personnel of IIEES had great cooperation with me during out-time stays in the laboratory.

Small strain monotonic triaxial tests were performed at the Soil Mechanics Laboratory, National Institute for Rural Engineering (NIRE) in Tsukuba, Japan. Without significant supports of Dr. Yoshiyuki Mohri, it was not possible to perform the tests in the period of my stay in Tsukuba. The helpful supports of Dr. Toshikazu Hori, Eng. Mitsuru Ariyoshi of NIRE, during the setup of tests is kindly acknowledged. Many thanks to the kind staff of NIRE, especially Mrs. Eiko Takahashi and Mrs. Yoshie Murata for their general supports during my stay in Tsukuba-shi.

I am particularly indebted to Eng. Afshin Naghshineh and Dr. Abdureza Fazeli and their kind families for their support during my stay in Shiraz city.

I had the opportunity to meet many great persons during my PhD course that influenced my vision in different aspects of life an. udy. Dr. Mohammad Taghi Izadi, Professor Ikuo Towhata, & Dr. Taro Uchimura from the University of Tokyo, Professor Leonardo Cascini from Salerno University, and my thesis advisor Professor Ching Shung Chang form the University of Massachusetts.

At last but not least, I want to thank my aunt, Ms. Mehrangiz Ghanimifard for her compassionate hospitality during my several stay periods in Tehran.

I dedicated my Ph.D degree to my mother and father with love.

Mahrashk Meidani
July 2008; Shiraz, Iran

ABSTRACT

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Gravel-Clay mixtures are abundant material in nature and are frequently used in certain civil engineering projects such as earth dams, levees and landfills. The impervious core of Karkheh dam, one of largest earthdams in the world, is made of this material. The advantage of using these soils lies in their low permeability owing to clay fraction and high shear strength due the non-cohesive granular part. To date, little research has been carried out to investigate the performance of these soils and therefore, their behavior under cyclic loading is still not well known. In order to investigate the cyclic behavior of gravel-clay mixtures, 51 cyclic and monotonic triaxial tests were performed on specimens with 11 different mixtures and under various confining pressures. Two different types of gravel, i.e. angular and round grains, were utilized to prepare specimens with the same gravel content in order to investigate the effect of granule shape on the cyclic behavior of the mixture. A phenomenon called *contact crushing succeeded by granule slippage* is introduced for the angular gravels. The importance of sampling method and specimen size for intermediate soils is also noticed.

Keywords: Cyclic Loading, Damping Ratio, Earthfill Dam, Granule Shape, Granule Contact, Gravel-Clay Mixture, Micromechanics, Shear Modulus.

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