Development and Evaluation of Solution for the Structure Damage Mitigation On/or Close to Surface Fault Rupture

INTRODUCTION

It is a fact that the permanent relative displacement of the ground due to earthquake is not considered in any seismic code all over the world, except for very long linear structures such as pipelines. This problem is currently considered to be beyond the capability of seismic design concept for structures in the earthquake engineering, although it must be dealt with somewhat. After earthquakes, some scientists from various disciplines say that "it was told before not to build the structures in this area since a fault or faults passed through it".

This statement is always encountered by the engineering community all over the world. If this advice is just followed any structure should not be built in seismically very active countries such as Turkey, Iran, Japan, Taiwan and the Western part of USA while the societies of these countries demand better living environments. Therefore, the engineering community must find the ways to be able to deal with the designing and building structures in active fault zones rather than just turning their heads other way. "

OBJECTIVES

One of the basic research subjects in geotechnical engineering for predicting the hazard is how to evaluate the ground deformations above earthquake faults. The shearing mechanism of overlying layers will be investigated to evaluate how the shear zone develops toward the ground surface. The soil structure interactions between surface structures and foundation ground under the influence of fault movement will also be investigated along with accumulating database from case histories in the past.

METHODOLOGY

- Study the effect of soil that overlies the bedrock fault to optimize the depth of excavation and fill replacement and evaluate to what extent the ductile property of the fill can affect the fault rupture propagation through the overlaying soil as an important tool in mitigation hazard against structures.
- Evaluation of using slip layers at the soil-foundations interface for decoupling ground motion associated to the fault from the foundation element of the structure.
- Evaluation of the foundation elements type on the behavior of the structure that built on active fault zone. So that it must be strong, symmetrical, and ductile.
- Study the effect of the used structural system of the superstructure on its behavior.. Conducting a relatively large scale physical model studies to be more representative for the evaluated mitigation measure in complete simulation with the numerical study of the proposed configuration to be well verfied

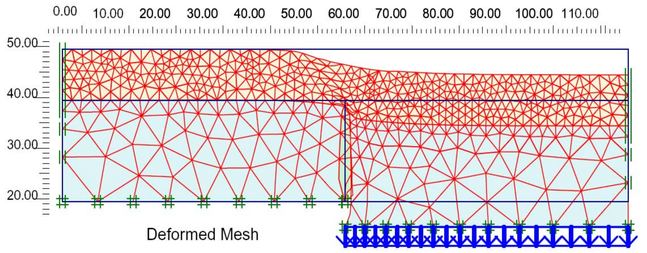


Figure 1: Ground Surface displacement, Contours & Profile, Part 1

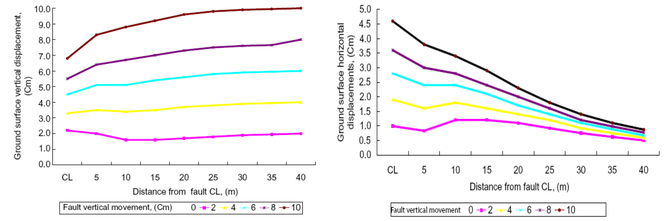
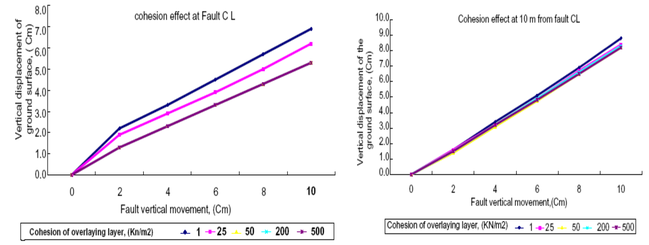


Figure 1: Ground Surface displacement, Contours & Profile, Part 2



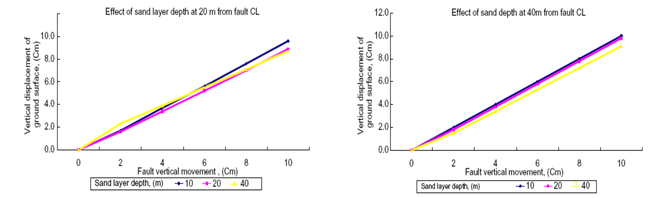


Figure 2: The studied parameters

The mentioned above parameters effect are from the preliminary study through the numerical simulation, that will be verfied with the r results of the physical model that is the next future step in the research program. Then the suggested solutions that may affect the pattern of ground surface movements will be evaluated through both the physical and the numerical models.

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