THE EFFECTS OF SOIL THICKNESS ON REVERSE FAULT RUPTURE PROPAGATION

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ABSTRACT

Fault setbacks or avoidance of construction in the proximity to seismically active faults, are usually supposed as the first priority by building codes and regulations. For instance, the well-known Alquist-Priolo Earthquake Fault Zoning Act of the State of California stipulates a setback of 50ft (15.3m) from each side of active fault traces, whereas the Iranian and the European seismic codes forbade any construction within the "immediate vicinity" of active fault traces. In this paper, based on some 1-g physical modeling tests, the effects of soil thickness on reverse fault rupture propagation are presented. It is observed that without consideration of the effects of soil thickness on surface fault rupture propagation, the setback provision does not give generally enough assurance for reverse faults.

INTRODUCTION

During strong earthquakes fault rupture often propagate to the ground surface threatening the safety of existing structures. This could have devastating effects on structures overlying the faults such as what was observed in the Turkey and Taiwan earthquakes in 1999. These observations reminded the profession and researchers to devote more efforts on surface fault rupture hazard mitigation approaches and investigations.

Different approaches have been adopted to investigate the surface fault rupture hazard. These have included field studies (Kelson et al., 2001; Faccioli et al., 2008; Jafari and Moosavi, 2008), physical modeling (Cole and Lade, 1984; Tani et al., 1996; Lee and Hamada, 2005; Bransby et al., 2008; Moosavi et al., 2010), numerical modeling (Bray et al., 1994; Anastasopoulos et al., 2007) and finally analytical approaches (Berill, 1983; Yilmaz and Paolucci, 2007).

Most building codes suggest using setbacks for mitigating damages caused by the effects of surface fault rupture, assuming that when rupture occurs, buildings are far enough away to avoid any damages. The aim of this paper is to investigate how thickness of soil layers can affect surface fault rupturing and to define the relationship between the position of the fault rupture on the surface (as shown in Figure1) and the