

The effect of soil cohesion and friction angles on reverse faults

ABSTRACT

Severe faults have caused many earthquakes around the world throughout history. More recently, earthquakes have occurred in Taiwan, China (Chi-Chi fault), and elsewhere, causing loss of lives and destroying many buildings and structures. These tectonic movements have gained attention from engineers, and in the past 15 years, the focus has been on faulting mechanisms. In this study, a physical model (1 g) was fabricated and used to evaluate the impact of a reverse fault in a field with a tunnel. In the 1 g model, researchers installed additional gauges on the tunnel, so that all the displacements could be adjusted, and all the responses could be monitored during faulting. An experimental study of various soil properties (cohesion and friction angles) in reverse faults on the tunnel lining were carried out and are described herein. A comparison of results for different levels of soil cohesion revealed that it can dramatically reduce the displacement by as much as 40%, and that friction angles of 27° can record approximately 60% more displacements than at 37° . Furthermore, a comparison of fault angles of 30° and 60° indicates that the displacements can be different by more than 43% in cohesionless soil and about 64% for a friction angle of 27° .