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Analytic Study of Three-Dimensional Rupture Propagation in Strike-Slip Faulting with Analogue Models

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Strike-slip faults are high angle (or nearly vertical) fractures where the blocks have moved along strike way (nearly horizontal). Overburden soil profiles across main faults of Strike-slip faults have revealed the palm and tulip structure characteristics. McCalpin (2005) has trace rupture propagation on overburden soil surface.

In this study, we used different offset of slip sandbox model profiles to study the evolution of three-dimensional rupture propagation by strike -slip faulting. In strike-slip faults model, type of rupture propagation and width of shear zone (W) are primary affecting by depth of overburden layer (H), distances of fault slip (Sy). There are few research to trace of three-dimensional rupture behavior and propagation. Therefore, in this simplified sandbox model, investigate rupture propagation and shear zone with profiles across main faults when formation are affecting by depth of overburden layer and distances of fault slip. The investigators at the model included width of shear zone, length of rupture (L), angle of rupture (θ) and space of rupture.

The surface results was follow the literature that the evolution sequence of failure envelope was R-faults, P-faults and Y-faults which are parallel to the basement fault. Comparison surface and profiles structure which were curved faces and cross each other to define 3-D rupture and width of shear zone. We found that an increase in fault slip could result in a greater width of shear zone, and proposed a W/H versus Sy/H relationship. Deformation of shear zone showed a similar trend as in the literature that the increase of fault slip resulted in the increase of W, however, the increasing trend became opposite after a peak (when Sy/H was 1) value of W was reached (small than 1.5). The results showed that the W width is limited at a constant value in 3-D models by strike-slip faulting. In conclusion, this study helps evaluate the extensions of the shear zone influenced regions for strike-slip faults.