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Acoustic Emission Characteristics of inhomogeneous fault model under the different loading condition

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The physical model with inhomogeneous fault has been designed and samples have been made from torpedo granite. The length, width and thickness of the rectangular sample are 500mm, 300mm and 50mm respectively. The width of pre-setting fault is about 1 mm and total fault has been divided as three segments with the similar length, each segment has been filled and felted with the admixture of gypsum and water with different strength. Among of them, the strength of middle segment is very strong and that of both sides are a little weaken. So, our model can conceptually simulate the barrier or asperity inside the fault surface concerning the earthquake pregnancy.

Experiment were performed in the biaxial loading rig in State key Laboratory of Earthquake Dynamics, CEA. Both axial loading and the lateral loading system are servo-control. Using four samples of inhomogeneous fault model, under different confing pressure (5Mpa, 7.5Mpa and 10Mpa, respectively), six aspects have been studied:

1. Failure mode of the fault and the relationship with the mechanical loading type.
2. Dynamic evolving of AE spatio-temperal distribution images with loading process.
3. Expanding characteristic of mass microfractures inside the sample, especially inside the fault surface and surrounding area.
4. Variety of b values of G-R relationship during the process of deformation and failure.
5. Variety of fault displacements at different fault segments and the relationship with the deformation process.
6. Variety of Vp/Vs at different positions (at the fault, near the fault and far from the fault) during different deformation stages.

Finally, aim at these inhomogeneous fault model and experiment results, some other problems have been discussed. Particularly, we are very interested in the precursory phenomena before the fault fracture (abrupt instability) of fault gradually failure.

Keywords: Acoustic Emission; Inhomogeneous fault model; AE spatio-teperal disributon; b values; Vp/Vs; fault displacement.