Influence of form of fracture zone on amplification of earthtide and seismic waves at the fracture zone

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Tidal strain across the fracture zone was about ten times as large as the observed near the fracture zone. Strain seismograms across the fracture zone are also from 5 to 15 times as large as at the neighborhood. The calculation with FEM shows that the depth of fracture zone is larger, amplitude ratios at the fracture zone to that at the neighbor is also larger. Amplification of ten times needs that the depth of fracture zone is not less than several meters. The vector of each tidal and seismic relative displacement across the fracture zone is almost fixed. But FEM doesn't shows that. These suggest that the relative movement across the fracture zone is caused not only by the deformation but also by the block movement.

Geodetic survey and continuous observation of crustal deformation across faults or fracture zones have led to many evidences that crust was consisted of loosely coupled blocks mostly bounded by faults or fracture zones. In order to study the relative movement of two crustal blocks bounded by the fracture zone in the tunnel of Hokuriku observatory of Kyoto Univ. in Japan, three dimensional relative displacement meters were designed and has been set up across that fracture zone since 1986. They have measured tidal and seismic relative displacements between two fixed points in three orthogonal directions.

Tidal strain across the fracture zone was about ten times as large as the observed near the fracture zone. Tidal strain across the fracture was larger than the theoretical, whereas the observed near the fracture zone was smaller than the theoretical. Strain seismograms across the fracture zone are also from 5 to 15 times as large as at the neighborhood. Amplification factor is related to propagation azimuth of each seismic wave. These results indicated that the change of fracture zone width, in other words, compress-extension motion at the fracture zone causes the amplification of seismic waves. The vector of each tidal and seismic relative displacement across the fracture zone was almost fixed. This may be caused by the existence of the plane-like fracture zone.

In this paper, it is researched with FEM that influence of form of fracture zone on amplification of tidal and seismic. Results as follows;

1) Depth of fracture zone is larger, ratio of amplitude at fracture zone to that at the neighbor is also larger. Amplification of ten times needs that the depth of fracture zone is not less than several meters. But this result is presumed upon the wave of 50 to 200Hz, so research is still more needed.

2)FEM doesn't shows that the vector of each tidal and seismic relative displacement across the fracture zone is almost fixed. This suggests that relative movement across the fracture zone is caused not only by the deformation but also by the block movement.