A PROPOSAL OF THE NEW PARAMETER FOR ASSESSING SEISMIC DISASTER

by

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Summary

The purpose of this paper is, then, to search for a technique to evaluate the influence of the impending earthquake based only on the guess of geometry of 'should be' fault and without any dynamical informations.

Through repeated trials, the author has arrived at the conclusion that the intensity seismic vibration is well reflected to the solid angle extended from observation site toward the periphery of the fault.

1. INTRODUCTION

There are at least two categories among modern seismological research items which seem to be promising toward future earthuqake engineering. One among them is the study of focal process of earthquake and the other is earthquake prediction.

Focal Process

Integration of seismograms to depict what sort of dynamic process has caused that event in relation to tectonic system of the focal area has come into popular practice among seismologists. This technique can easily be extended to guess the pattern of seismogram which should be recorded at any arbitrary site, which feature seems to be of great value since it is expected to produce invaluable data for disaster

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reduction strategy. However, lack of knowledge to enable the prediction of detailed focal process in the present stage causes a bottleneck for the practicality of this approach.

Earthquake Prediction

Earthquake Prediction is divided into two categories depending on the duration in time after issuance of warning until the occurrence of the earthquake: long term and short term prediction. It is without saying that short term prediction is much more effective for reducing loss of human lives and properties. From standpoint of building constructions with longer lifespan, however, long term prediction is useful as well and should adequately be taken into account. Only what makes the circumstance complicated is that for long term prediction, no detailed information is available. What is needed for the technique to make the best use of the long term prediction, therefore, is that it reflects the meager knowledge about the impending earthquake to disaster reduction strategy.

It might be premature to disscuss the successful use of this information since considerable amount of misestimate cannot be avoided, but it is the firm belief of the author that every possible effort should be paid to minimize the earthquake disaster by making the maximum use of the knowledge of that time.

2. Parameter M and Δ

The trial is customarily made to associate the seismic damage with the magnitude M of that earthquake and with the distance Δ from the epicenter. Various formulas are successfully proposed in this regard proving that this technique is promising for application to seismic disaster assessment. However, it needs some remark that each of the two parameters has its own inadequateness judging from seismological view point.

3. New Parameter

Seismic disaster or intensity of earthquake is regarded as a complicated function of motion. It is hardly possible to express it with a limited number of parameters, but as a primary step to the study, a parameter is endeavoured for expressing the acceleration in place of M and Δ.

For that purpose we start form a simple a priori assumption connecting seismic peak acceleration and source geometry. Further detail is talked on the meeting, but we have arrived at the conclusion that peak acceleration may be proportional to the solid angle extended from the site to the fault.

4. Miyagiken-Oki Earthquake

An example was taken of Miyagiken-Oki Earthquake which occurred in 12th of June 1978. Reported peak accelerations for this earthquake are plotted against the solid angle extended to the fault plane from the site on log-log sheet in Fig.1. It is observed in Fig.1 that plots are allined on a single line with gradient of unity as is expected showing that our a priori posturation is not physically absurd.

5. Conclusion

It should be admitted that several clear drawbacks do exist for the technique proposed here. That information of minute structure of fault generating dynamics is entirely neglected, and that dipole source is not appropriate from modern seismological understanding are points among those which need to be improved.

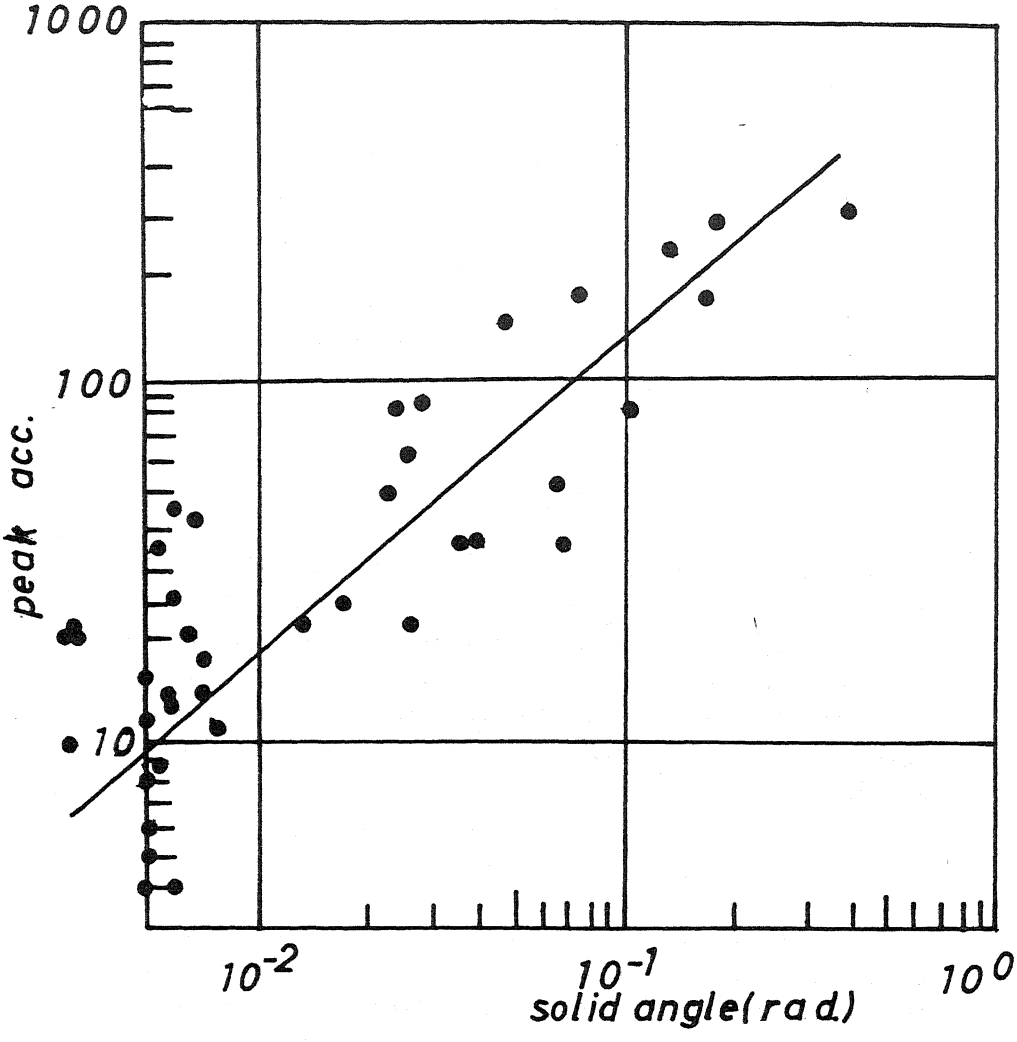

Fig. 1