METHOD AND RESULTS OF THE STRONG MOTION MODELLING. THE GAZLY EARTHQUAKE OF MAY 17,1976.

by

Ju.Kopnichev[I], I.Nersesov[II], G.Shpilker[III]

SYNOPSIS

A new method of the synthetic seismograms calculation has been developed. The earthquake mechanism, experimental characteristics of the high-frequency radiation and inhomogeneity of the real media are taking into account in this method. Using this method, the Gazly earthquake accelero - gram has been modelled.

INTRODUCTION

The development of the strong motion statistical model is the main purpose of this work. The base of this model is the new experimental data:

(i) For the strong earthquakes with magnitudes $5.5 \leqslant M_S \leqslant 8.7$ the strike slip events have the horizontal size L_o 2-3 times bigger, then the thrustsand normal faulting events /Kopnichev et al.,1979/

(ii) The average rupture velocity v strongly depends on the earthquake mechanism: v = 3.45 km/sec for the thrust faulting events, v = 2.45 km/sec for the strike slip events and v = 2.20 km/sec for normal faulting events /Aptikaev,Kopnichev,1979/

(iii) The high-frequency radiation power $W(t)$ increases with time t by the manner depending on the earthquake mechanism: $W(t) \simeq t^{3.2}$ - for the thrust faults, $W(t) \simeq t^{1.8}$ - for the strike slip faults and $W(t) \simeq t^{1.2}$ - for the normal faults/Nersesov at al.,1979/.

The peculiarities of our strong motion modelling method are as follows:

1. The division of the whole power $W(t)$ onto the regular (source) component $W_z(t)$ and the scattered component $W_s(t)$ appearing due to the media inhomogeneity/Kopnichev,1979/.
2. The usage of the fault element radiation law, based on

I Cand. of Phys.-Math. Scs.,I.P.E. USSR Ac. Scs.

II Cand. of Phys.-Math. Scs.,Head of Seism. Dept. I.P.E. USSR Ac. Scs.

III I.P.E. USSR Ac. Scs.

the experimental characteristics of the high-frequency radiation /Kopnichev,1979; Nersesov et al.,1979/

3. The analytical representation of the media responce, independently for the regular and scattered components of the wave field.

The strong motion calculation algorithm has the next steps:

1. The wave field is dividing onto the few narrow frequency bands $[f_K, f_K+\Delta f_K]$ similar, for example, CHISS channels /Zapolsky,1971/.
2. For the each frequency band the record envelops are determinined, taking into account the regular and scattered components.
3. These envelops are being filled by the quasiharmonic random processes.
4. All CHISS-records are summing in the given frequency interval.

SOME RESULTS OF INVESTIGATIONS

This algorithm has been used for the Gazly earthquake accelerogram modelling (May 17, 1976, M_S = 7.2/Aptekman et al.,1978/), thrust faulting mechanism/Vvedenskay A.V., personal communication/.

The synthetic accelerogram, calculated for the six CHISS channels (f = 1-27 hz), is shown on fig.1. It is possible to conclude, that the most important parameters of the real and synthetic accelerograms - the form of the records, the maximum amplitudes and the spectral content are close to each other. We hope, that this method can be used for the seismic vibration prediction in the areas where the real strong motions do not exist.

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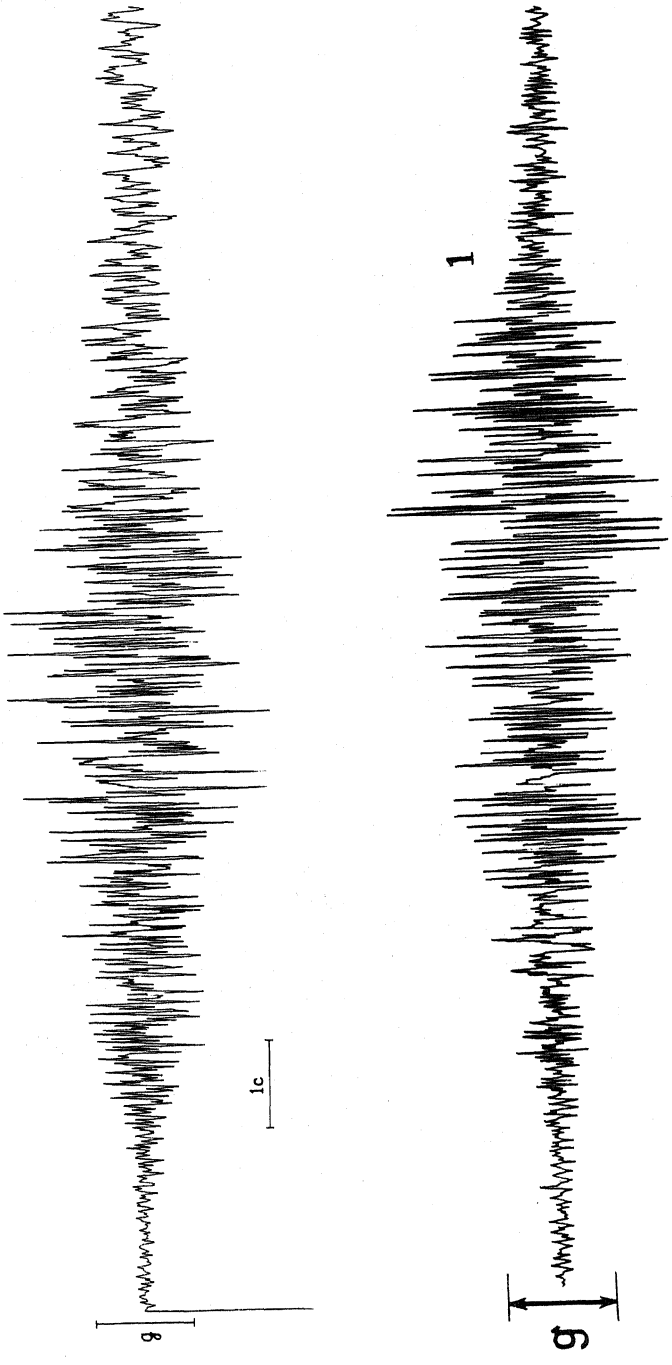

FIG.1 - REAL(1) AND SYNTHETIC (2) ACCELEROGRAMS.