PROPERTIES OF STRONG EARTHQUAKE IN CASE OF ELASTO-PLASTIC SURFACE LAYER

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SYNOPSIS

Earthquake motions on a nonlinear surface layer are calculated by finite difference method. An appropriate condition is given at the bottom of the surface layer so that the wave can transmit downwards into infinity.

RESULTS OF ANALYSIS

At the time of strong earthquake, the strain produced in surface layer of the ground would amount to the order of 10^{-2}. In this strain range, soil does not behave as elastic medium any more. Therefore, the properties of strong earthquakes on soft surface deposits seem to be quite different from small earthquakes ever recorded. The simulation has been performed under the assumption that SH wave comes up and goes down vertically. Therefore, the problem has been reduced to one-dimensional. Earthquake motion of ground is given as eq.(1) where, τ indicates shear stress in the

$$\rho \frac{\partial^2 u}{\partial t^2} = \frac{\partial}{\partial x} (\tau) \qquad (1)$$

ground. Eq.(1) has been solved by finite difference method. Stress strain relationship in the surface layer is assumed bilinear hysteresis type and underneath layer is assumed to remain elastic. The following have been obtained from this simulation.

i) Amplification factor at the predominant periods of surface layer decreases so much if the surface layer enter the nonlinear range even slightly.

ii) If the incident earthquake is actual one, the predominant periods do not shift to the layer period, but the predominant period keep the previous position and the other new long period appear.

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