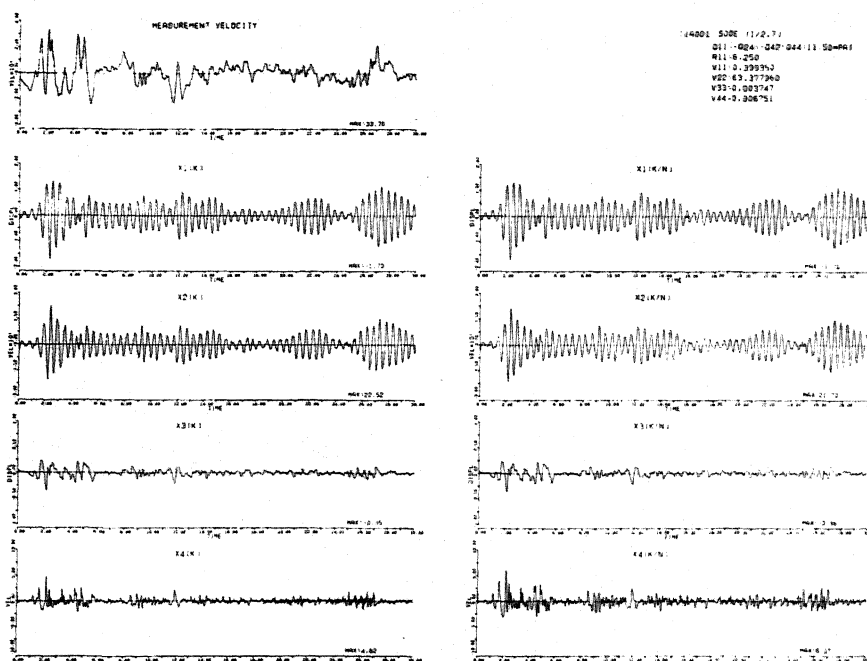


EARTHQUAKE RESPONSE ESTIMATION  
OF STOCHASTIC SOIL-STRUCTURE SYSTEM

by  
MINORU TOMIZAWA\*

Regarding the combined system which consists of the soil-layer with white noise excited bedrock and a structure built on the layer as a soil-structure dynamical system governed by Itô type stochastic differential equation, the response motions of both the ground surface and the structure are represented by Markov vector process. Since the earthquake motion recorded at the ground surface is considered as a noise corrupted sample wave of an element of state vector process of the system, it is possible to evaluate the most probable response of the system, which is to maximize the conditional probability density function of state vectors based on the observed sample wave. From transforming mathematical meaning to physical one, thus estimated state can be regarded as equivalent to the most occurrence state of the system under the condition that, though it is rarely obtained, the extensive accumulation of recorded actual earthquakes generated from common epicenter has been prepared. The implementation of this method requires the following input data; (1) Intensity of white noise power spectral function of the bedrock, (2) Dynamical characteristics of the structure, (3) Dynamical properties of the soil-layer, (4) Recorded earthquake velocity wave form observed at the site, (5) Assumed signal-noise ratio of measurement, or velocity wave. The following illustrations show the most probable response state of an example system.



\* Faculty of Eng. & Science, Science Univ. of Tokyo, Noda City, Chiba, 278, JAPAN.