01 May 1981, 1:00 pm - 2:30 pm

Session 9: Closing Remarks

T. Kuppusamy

Closing remarks by Co-chairman T. Kuppusamy.

There are five papers in this session: "Seismic Response of Subsurface Ground" by Iwasaki et.al., "Zonation of Central U.S. Earthquake Sources" by Moore et.al., "Different Magnitude-Epicentral Intensity Relations" by U. Chandra, "Analysis of Stresses in Seismically Induced Shallow Slope Failure" by Vallejo et.al. and "On Surface Wave in Gibson Half-space" by Vardoulakis et.al.

Iwasaki et.al. presented measured underground acceleration records at three sites aroung Tokyo Bay induced by moderate earthquakes. The three sites were, (1) Ukishimia Park, with sand and gravel mix (with N value ≈100) and top 50' with silty clay ($N \leq 5$); (2) Futtsu Cape, with silty sand (No N value given, it would have been useful for comparison if it is given), and (3) Kannonzaki area with silty rock. Based on the observation it is concluded, although the acceleration in general decreased with depth (which is not new), there are some cases where the underground acceleration were appreciably longer than the ground acceleration. It would have been more interesting and useful if the three sites were analyzed by using finite element model with appropriate soil properties. The response of each site condition would have yielded specific attenuation characteristics of the site. However, the data presented will be useful for analysis.

It is true that earthquake potential and risk assessment should be understood by the owner and the designer of a facilty. However, the leaders and experts in the profession should formulate guidelines for the designers to understand the environment. It is assessed by Hempen and Rockaway that the earthquake source zone concept should be used for central U.S. active faults are not recognized. Some of the discussions in this paper will be useful for future development of codes for central U.S.

Umesh Chandra observes that for large magnitude earthquake M-I_o relation yield different I_o values and if these I_o values are used for estimation of design acceleration, unacceptable accelerations result. Instead, M_L - I_o relationship is recommended by the author on account of the satisfactory agreement with many Western U.S. acceleration - distance relations published in literature. However, if similar observations in other regions are also obtained it will prove a useful conclusion.

The procedure adopted by Vallejo et.al. for slope analysis is a conventional one. He proves shallow planar failure than rotational slide. This is obvious on account of the assumed seismic force predominant in the analysis.

Analysis of surface waves in a half-space with shear modulus increasing with depth (Gibson half-space) is discussed by Vardoulakis et.al. The dispersion law is disucssed with some numerical results. The results may be useful for engineers when similar site conditions are met with.

In general there is little common in all three papers, especially with respect to numerical methods. I think there are many papers containing interesting numerical modelling work in other sessions of this conference. Numerical modelling for geotechnical earthquake engineering is a growing field. The various methods like, finite element, finite difference, boundary element and characteristic methods are potential areas of research. There is a wide field with many ambiguities in these areas, especially the formulation of soil stiffness and damping properties to be input in these models. Many of the numerical models currently used are still to be studied and imporved for reliable and economical (cost) application to practical problems.