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1981 - First International Conference on Recent
Advances in Geotechnical Earthquake
Engineering & Soil Dynamics

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

Discussions

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Recommended Citation

Gupta, Dinesh C. and Hempen, G. L., "Discussions" (1981). *International Conferences on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics*. 7.

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Discussion by Dinesh C. Gupta, U.S. Nuclear Regulatory Commission, Washington, DC, "Seismic Response Of Subsurface Ground With Use Of Measured Underground Acceleration", by T. Iwasaki.- et. al.

The paper by Iwasaki, Kawashima, and Takagi is a valuable contribution to the understanding of the influence of soil conditions on ground motions during earthquakes. It provides much needed additional recorded earthquake data and analyzes the recorded ground motions taken at three sites in Japan from 1970 to 1978 from 8 earthquakes of magnitude 4.8 to 7.2. The sites are located at epicentral distances ranging from 30 km to 320 km.

It is well known that the earthquake-induced ground motions recorded at a given site depend on the geometries and material properties of in situ soils, magnitude of seismic input base motion and the frequency characteristics of the input motions. In considering the amplification or attenuation of the base input motion at a given site for any earthquake, the geometry of the site is not a variable. However, for analysis purposes the properties of the soil within the profile are strain dependent and can be affected significantly by the input base motion characteristics. Also, the frequency content of the motion at the input base may be affected significantly by the characteristics of the wave-transmitting media, the site epicentral distance, and the depth of focus.

Olsen and Chen (1969) in a discussion on the paper by Seed and Idriss (1969) on "Seismic Response of Horizontal Soil Layers" presented the results of computation of surface motion for an assumed site excited by two recorded earthquake time histories. They concluded that the ratio by which surface motions are modified relative to input base motions are independent of the nature of input base motions. It is interesting to note that using the results of this paper, similar conclusions may be drawn for the recorded motions at two sites, Ukishima Park and Kannonzaki, for which results have been presented by the authors. The amplification ratios at various frequencies, however, depend on the site characteristics. As pointed out by the authors, the frequency response functions at Ukishima Park have several sharp peaks, while the ratios of amplification for the Kannonzaki site are rather uniform in the frequency domain.

The results of analyses presented by the authors provide excellent examples of the influence of soil conditions in modifying the underlying base input motions induced by earthquakes.

REFERENCES

Olsen, H. W., and A. T. F. Chen (1969), "Seismic Response of Horizontal Layers." Discussion on Paper by Seed, H. B. and I. M. Idriss, Proc. ASCE, Journal of Soil Mechanics and Foundation Engineering, Vol. 95, No. SM3, May 1969, pp. 927-930.

Seed, H. B., and I. M. Idriss (1969), "Seismic Response of Horizontal Layers," Proc. ASCE, Journal of Soil Mechanics and Foundation Engineering, Vol. 95, No. SM1, January 1969, pp. 99-137.

Discussion by G.L. Hempen, Corps. of Engineers, St. Louis, on "Differential Magnitude-Epicentral Intensity Relationship" by U. Chandra.

$M_b - I_0$ relations are region dependent as pointed out by Chandra. Central U.S. events seem to agree with slope of eqn (2) and (3) of Chandra's paper.