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Session 1A: Opening Remarks and Moderator's Report

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SESSION 1A
Opening Remarks by Chairman
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"Thank you Dr. Prakash. Ladies and gentlemen, it is a pleasure and a privilege to act as Chairman for Session 1A, 'Load Deformation and Strength Behavior of Soils Under Dynamic Loads'. I would like to introduce Professor Kenji Ishihara, University of Tokyo, who is Co-Chairman of this Session. Dr. Ishihara, as you know, is an international expert on the behavior of soils under dynamic loadings, and we will look forward to his comments as the session progresses. For the benefit of any students here, I should note that Dr. Ishihara's 1970 paper entitled, "Approximate Forms of Wave Equations for Water-Saturated Porous Materials and Related Dynamic Modulus' is considered a classic by many of us and my students know which paper it is when I say 'Ishihara, 1970'.

Before we begin with what promises to be a very interesting session, I wish to add a few comments as a member of the Organizing Committee of this Conference. As you all should know, Dr. Shamsher Prakash had the original idea for the Conference, determined its feasibility through international correspondence, arranged for selection and publication of papers, and arranged all the details of the Conference. The Organizing Committee primarily offered moral support, added a few comments, and made minor contributions to the review of papers. I suggest that we give a "big hand" to Dr. Prakash and his University of Missouri-Rolla staff for excellent preparations and organization of this International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics".

Moderator's Report
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The subjects addressed by the papers for these sessions can be categorized under the headings:

Laboratory Tests
Insitu Tests
Correlations Between Field and Laboratory Tests
Soil Models and Constitutive Equations
Apparatus Development
Others

Many of the papers consider more than one of these categories. The salient issues and features of each of these areas is discussed separately in the following.

Laboratory Tests--Papers in this category clearly illustrated continuing concerns for certain aspects of dynamic soil testing. Among these were the persistent concerns for stress distribution at boundaries and within test specimens (DeNatale, et al; Desai; Kovacs and Leo) [1]. These concerns were highlighted by Woods (1978) for the Pasadena Conference and still represent an issue for discussion. Silver in his state-of-the-art paper of session 1A, however, correctly pointed out that we should not dispare in not producing specimens with perfect stress distributions, as it is still possible to obtain useful information as long as the actual stress distribution and boundary effects are known.

Other areas of major concern were the dependence of G_o (maximum shear modulus) on strain-rate and creep. The previous view that a constant G_o existed at strain levels below some threshold may be replaced by an understanding that G_o may be a function of strain-rate as well as shearing strain amplitude (Isenhower and Stokoe). Other studies (Athanasopoulos and Richart) showed that the rate of drained creep can influence the shear modulus of normally consolidated clays during the primary stage of modulus increase, but the rate of drained creep does not influence the secondary stage of modulus increase.

Progressive strain or residual displacement due to cyclic loading is still a major area of study as indicated by contributions to this session (Goitom and Baladi; Chang; Timmerman and Leelanitkul; Baladi et al; Chaney and Fang). These phenomena are functions of the number of cycles and strain amplitude, but in sands according to one paper, are independent of the average effective confining pressure (Timmerman and Leelanitkul), while according to another paper are dependent on average effective confining pressure (Baladi et al). The latter view was presented earlier by Silver and Seed (1971). The influence of the number of cycles of loading on pore pressure development in clays was also reported (Hicher and El-Hosri).

Two approaches for predicting dynamic soil properties from static tests were presented (Kavazanjian and Hadj-hamou; Chae et al). These attempts will need further confirmation and refinement before being applied in practice. However, the reverse process (determining static properties from dynamic laboratory and in-situ tests) has solid justification and deserves more attention.

In-situ Tests--Contributions to these sessions concerning in-situ tests described efforts to measure shear modulus and damping at low and high shearing strain amplitudes (Grant and Brown; Andreasson; Mori and Tsuchiya) and Poisson's ratio (Fu-lan). The high shearing strain amplitude screw-plate tests in soft clay by Andreasson have potential but need refinement in interpretation.

Attempts to use correlation techniques and frequency domain analysis in seismic tests as encouraged by Woods (1978) were described in two contributions (Andreasson; Tokimatsu and Midorikawa). This direction of research needs to be pursued further.

Correlation between field and laboratory tests--Several efforts to correlate shear modulus measured in the field to shear modulus measured in the laboratory and computed from empirical equations were presented (Fang et al; El-Hosri et al; Wen-yao and Tain-long; Hu; Grant and Brown; Mori and Tsuchiya). The maximum shear modulus (low amplitude) measured in the field was

[1] Reference citations for papers submitted to these sessions are given by name of authors only. In the reference list these papers are identified as being in Volume I or II of the Proceedings.

usually higher (up to four times) than the maximum shear modulus measured in the laboratory, although it was not evident in these correlations that all known factors affecting low amplitude shear modulus were taken into account. In the writers view these correlations should be improved with proper attention to the critical factors.

Correlation of seismic velocity with geotechnical classifications of soil and rock and other geotechnical parameters were also presented (Lew et al).

Analytical Models of Soil Behavior--It is evident from the number of papers submitted to these sessions that considerable interest and effort is being directed toward development of constitutive equations for soils and analytical models to predict soil behavior. At this conference the major efforts reported were directed at: 1) models to predict pore pressure and deformation as functions of time and number of load cycles (Gyoten et al; Zhiliang and Yuging; Sangrey and Lascko; Chang and Fang; Dyvik et al, 2) constitutive equations (Szavits-nossan and Kvasnicka; Dafalias et al; Oka and Washiza, and 3) models to characterize interface phenomena (Desai; Gadhinglajkar et al).

Apparatus--Apparatus development and refinement for both field and laboratory measurements continues to be a topic of great interest attracting six papers for these sessions. Some apparatus represent first generation equipment described here for the first time (Wei et al; Andreasson; McNeill and Reece), while other contributions represented modifications or refinements to established apparatus (El-Hosri et al; Akai et al; McNeill and Foster).

Of particular interest at session 1B was the equipment for determining high shearing strain shear modulus using a dynamic screw-plate test, and equipment for crosshole tests in soft clay which eliminate the need for boreholes (Andreasson).

Others--Interests in offshore geotechnical activities (McNeill and Foster; McNeill and Reece), in blasting vibrations (Deo et al; Rui-jeng and Zhen), in dynamic criteria for tailing dams (Ishihara et al), cyclic loading of grouted sand (Rosenfarb and Huckman), and in dynamic rock testing (Rajaram) were all expressed by contributions to these sessions.

Summary--In the writer's view the most important topics and concerns addressed by papers to and discussions at these sessions were: 1) the importance of interface phenomena in soil-structure interaction and seismic wave propagation, 2) the attempts to perform high shearing strain amplitude tests in-situ, 3) the identification of the strain-rate dependence of shear modulus at all strain amplitudes, and 4) the disappointing correlations between field and laboratory measurements of shear modulus.

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