Sixty-fourth Annual Meeting Papers

Symposium on
Soil Dynamics

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FOREWORD

The papers and discussions in this publication were sponsored by Committee D-18 on Soils for Engineering Purposes, Subcommittee R-9 on Dynamic Properties of Soils and presented at a Symposium on Soil Dynamics during the Sixty-fourth Annual Meeting of the Society held June 25–30, 1961 at Atlantic City, N. J.

Rockwell Smith, Association of American Railroads, presided at the session, and R. K. Bernhard, Rutgers University, was chairman of the Symposium Committee.

The papers in this symposium discuss many of the current concepts in the areas of stress-deformation-time relationships and test instrumentation and measurement.

NOTE.—The Society is not responsible, as a body, for the statements and opinions advanced in this publication.

CONTENTS

SOIL DYNAMICS (Classification Table)

GEOPHYSICS

MAIN DIVISIONS	Microseismics	Macroseismics
Ranges:		
Distance: 0 to approx 1000 ft		Up to several thousand miles
Frequency: Approx 1 cpm to approx 1000 cps		
BASIC CONCEPTS		Seismology
Forces:	Vibratory	
Form:	Periodic — Non-periodic	
	Sinusoidal — Impact	
Wave Characteristics:	Surface — Subsurface	
	Standing — Propagating	
	Longitudinal — Transverse	
Rotational (Shape-Change) Irrotational (Volume-Change)		
Dilatational: Compression and rarification		
Shear		
Rayleigh, Love (Quer), etc.		
Reflection — Refraction		
Velocity (phase-, propagation-group-)		
Media (same as in Soil Statics)		
Soil Types: (Organic — Non-organic; Homogeneous — Non-homogeneous; Cohesive — Non-cohesive)		Rock-Air-Water
Energy State:	High — Medium — Low	
	Viscoelastic — Elastic	
Stresses:	Tension-Compression-Shear	
Temperature:	Non-frozen — Perma-frost	
Dynamic Characteristics:	Moduli of elasticity, of shear, of bulk	
	Poisson's Ratio, Lamé's constants	
	Critical frequency responses	
System Analysis:	Dynamic analogies—prototypes	
	Density, compaction	
	Stress fields; Isobars (Trajectories of equal principal- and shear-stresses)	
	Mass—Inertia—Effects	
APPLIED CONCEPTS		
Functional Groups:	Structures, railroad beds,	
	Highway and airfield subbases,	
	Foundations, dams,	
	Embarkments, fills	
Instrumentation:	Measuring technique	Seismometry
Pick Up Units		
Surface:	Displacement meters	
	Velocity meters	
	Accelerometers	
Subsurface:	Pressure-shear cells	
Excitors:	Oscillators (mechanical, electrical),	
	Hammerblows, blasts,	Nuclear blasts
	Not-perfectly balanced (reciprocating or rotating) machinery	
Subject Matter:	Vibro-soil stabilization and compaction,	Detection of earthquakes
(referring to Vibration Susceptibility)	Strata depth determination	
	Vibro-pile-driving	
	Transmissibility of vibrations through soils	Discrimination between earthquakes and nuclear blasts
	Density changes during and after vibrations	
	Density determination (radiation—isotopes—and other methods)	
	Effect of moisture contents	
	Subsurface exploration (refraction shooting and related methods)	
	Resistance of soils affecting cross-country locomotion (trafficability)	
	Vibration response to frost susceptibility and ice formations	

THIS PUBLICATION is one of many issued by the American Society for Testing Materials in connection with its work of promoting knowledge of the properties of materials and developing standard specifications and tests for materials. Much of the data result from the voluntary contributions of many of the country's leading technical authorities from industry, scientific agencies, and government.

Over the years the Society has published many technical symposiums, reports, and special books. These may consist of a series of technical papers, reports by the ASTM technical committees, or compilations of data developed in special Society groups with many organizations cooperating. A list of ASTM publications and information on the work of the Society will be furnished on request.