nism of the slides, and remedial measures. The behavior of certain special types of structures are discussed in chapters by J. E. Rinne on oil storage tanks, and by J. F. Meehan on public school buildings. W. K. Cloud brings together the limited available data on ground motion records, including accelerograms and spectrum curves for several small aftershocks. The results of measurement of the fundamental natural periods of several buildings in Anchorage are reported. A second chapter by Cloud gives the results of forced vibration measurements of a damaged multi-story building in Anchorage, with resonance curves, mode shapes, and natural periods and damping of lateral and torsional modes of vibration. In a chapter by J. A. Blume, these experimentally determined values for the damaged building are compared with estimated pre-earthquake properties of the structure as inferred from a dynamic analysis. A chapter by H. Kawasumi and E. Shima of the Earthquake Research Institute of the University of Tokyo gives the results of the microtremor measurements in the Anchorage region, along with spectrum curves and a study of possible relationship between spectrum peaks and calculations based on estimated thickness of sub-soil layers and approximate shearwave velocities. Included with the volume is a 33⅓ rpm phonograph record reproducing a tape recording made during the earthquake which gives some interesting sidelights on human responses to earthquakes as well as some valuable information on the time duration of the heavy ground shaking. The Alaskan earthquake contains many lessons for earthquake engineers, and the availability of so much factual information at a bargain price is a notable contribution.

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Seismic Love Waves, by Z. S. Andrianova, V. I. Keilis-Borok, A. L. Levshin and M. N. Neigauz, translated from the Russian by F. M. C. Goodspeed, Consultants Bureau, New York, 1967, 91 pp.

This monograph is devoted to a methodical mathematical study, using the spectral theory of linear differential operations, of surface Love waves. The authors are affiliated with the Institute of Chemical Physics and the Institute of Physics of the Earth of the Academy of Sciences of the USSR.

Chapter 1 develops the basic theory of Love waves, Chapters 2 and 3 describe how Love waves are used to infer the structure of the crust and upper mantle and Chapter 4 treats the relations between observations and parameters of the source. An appendix contains results which were not present in the original Russian edition discussing the effects of sphericity and absorption and the calculation of partial derivatives of phase and group velocity with respect to the elastic parameters of the media.

A brief view of the approach used in this monograph can be given as follows. Consider the familiar equation for Love waves in a layered media

$$\frac{d}{dz}\left(\mu(z)\frac{dV}{dz}\right) + \{\sigma^2\rho(z) - \xi^2\mu(z)\}V = 0 \tag{1}$$

where $\mu(z)$ is the rigidity, $\rho(z)$ is the density, ξ is the wave number and σ the characteristic frequency. Boundary conditions are that $dV/dz = 0$ at $z = 0$, continuity of V and $\mu dV/dz$ at interfaces and vanishing of the displacement at infinity. The investigators define a continuous function

$$\theta(z) = \text{arc tan}\left(\frac{\mu(z)\dfrac{dV}{dz}}{V}\right) \tag{2}$$

such that

$$\frac{d\theta}{dz} = -\frac{1}{\mu(z)}\sin^2\theta - (\sigma^2\rho(z) - \xi^2\mu(z))\cos\theta. \tag{3}$$

At $z = 0$ $\tan\theta = 0$, assuming $\theta(0) = 0$; the finiteness of displacement at infinity leads to

$$V(z) = B\exp\left(-\sqrt{\xi^2 - \frac{\sigma^2 z}{\beta^2}}\right) \tag{4}$$

and

$$\theta(z) = -\text{arc tan}\left(\mu(z)\sqrt{\xi^2 - \frac{\sigma^2}{\beta^2}}\right) - (K-1)\pi \tag{5}$$

where B is a constant, β is the shear velocity and K corresponds with the number of the characteristic value ξ_K^2. Characteristic values are found by numerically integrating equation 3 with an initial condition given by equation 5 until $\theta(0) = 0$ at $z = 0$. Straightforward calculations yield the displacement function $V(z)$ and the group velocity U is obtained from the expression

$$U = \frac{1}{\sigma/\xi}\,\frac{\int_0^\infty \mu V^2(z)\,dz}{\int_0^\infty \rho V^2(z)\,dz}.$$

Curiously, the identity of this expression to the energy integrals first discussed by Meissner in 1924 and treated by Jeffreys (Geophys. J. *6*, 115–117, 1961) is not pointed out.

The development of partial derivatives of phase and group velocity with respect to the layer physical parameters is approached using straightforward variational calculus. However, it is assumed that the shear velocity and density are *piecewise* linear functions of depth or radius. This leads to partial derivatives being specified in terms of the velocity and density at the *upper* boundary of the i^{th} layer and the velocity and density gradient *within* the layer. This is a somewhat different approach from other American and Japanese investigators who have utilized constant velocity and density layers.

The monograph is comprehensive although the presentation is somewhat pedantic. For its insight into a rigorous mathematical approach to surface wave problems it deserves consideration by every serious geophysicist.

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