

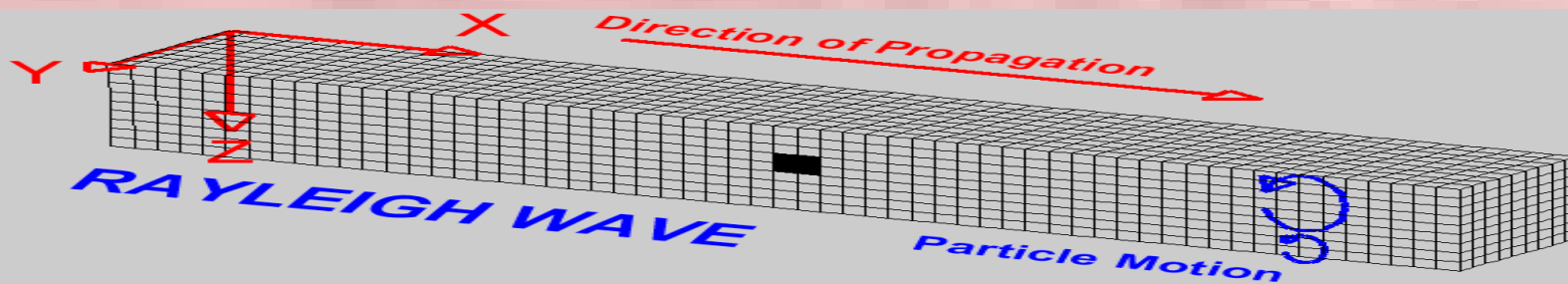
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# *Soil Dynamics*

*Mehdi Mokhberi*

*Islamic Azad University, Estahban*



***The most common problems that engineers encounter in the field of soil dynamics include:***

- 1. Seismic induced ground movements and wave propagation;***
- 2. Foundations for heavy or vibrating machinery;***
- 3. The changes of the bearing capacity of foundations under dynamic loads;***
- 4. The change in load capacity of deep foundations under dynamic loads;***
- 5. The changes of settlement due to dynamic loads;***
- 6. Increased lateral earth pressures due to dynamic loads;***
- 7. The potential for a soil to “liquefy” when subjected to dynamic loads;***
- 8. The potential for collapse of earth embankments under dynamic loads***



# *Content:*

**1. General Concepts & History of Soil Dynamic**

**2. Simple Vibrations**

**2.1 A free vibration system without damping;**

**2.2 A steady-state forced vibration system without damping;**

**2.3 A free vibration system with viscous damping;**

**2.4 A steady-state forced vibration system with viscous damping.**

**3. Measuring Vibration**

**4. system With Two-Degree of Freedom**

**5. Elastic Waves in bars**

**6. Stress Waves in Infinite Media**

**7. Dynamic Soil Properties.**

**8. Seismic Site Investigation & Laboratory Tests**

**8.1 Refraction Method**

**8.2 reflection Method**

**8.3 Down Hole**

**8.4 Cross Hole**

**8.5 Resistant Column**

**8.6 Vibrating Table**

**8.7 Dynamic Triaxial Test**

**9. Empirical Soil Properties**

**10. Earthquake, Ground Motion, Amplification , Microzonation and Design Spectra**

**11. liquefaction & Sand Boiling**

**12. Foundation Vibration**

**13. Dynamic Bearing Capacity of Shallow Foundation**

**14. Dynamic Bearing Capacity of Deep Foundation**

**15. Lateral Earth Pressure on Retaining Wall**

**16. Dynamic Stability of Slope**



# References:

1. *Das, B., "Principles of Soil Dynamics", PWS-Kent Publishing Co., Boston, 1993*
2. *Richart F.E., Hall J.R., Day W. R., "Vibrations of Soils and Foundations", Prentice-Hall Inc., New Jersey, 1970*
3. *Prakash S., "Soil Dynamics", McGraw-Hill, New York, 1981*
4. *Kramer S. L. "Geotechnical Earthquake Engineering", Translated by Mir Hosseini M., IIEES, 1999*
5. *Day W. R. "Geotechnical Earthquake Engineering Handbook", McGraw-Hill, 2002*
6. *Verruijt, A. "SOIL DYNAMICS", Delft University of Technology, 2004*



## *Measurement and Evaluation:*

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|-------------------------|------------|
| <i>1. Midterm Exam.</i> | <i>25%</i> |
| <i>2. Final Exam.</i>   | <i>50%</i> |
| <i>3. Term Paper</i>    | <i>25%</i> |



