پارامترهای دینامیکی

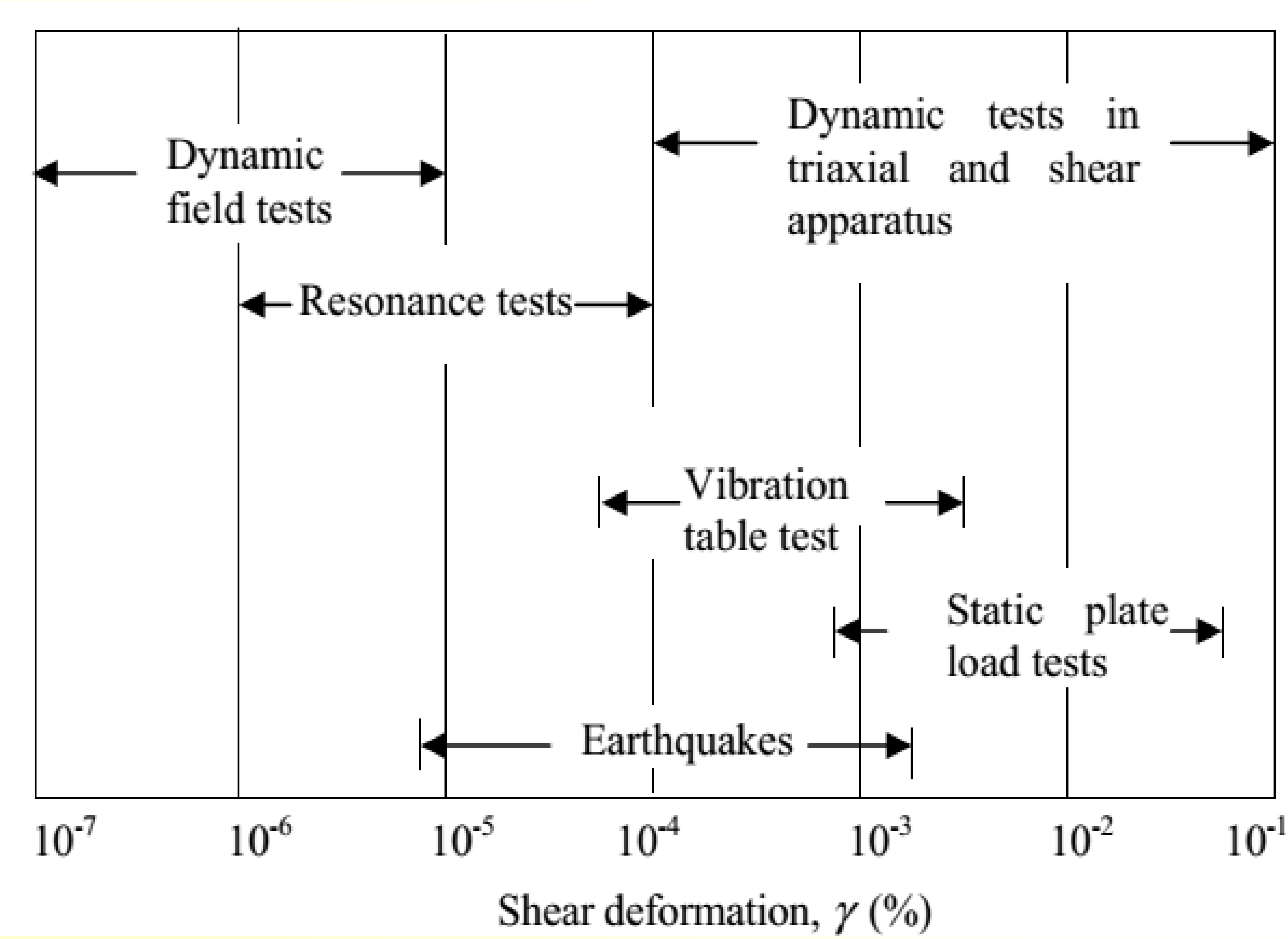
روشهای ارزیابی پارامترهای دینامیکی:

Table T4.2. Field and laboratory investigation techniques and related parameters.

Test class		Test type	Consolidation stress state	Shear strain γ[%]	Frequency f[Hz]	Stiffness	Damping	Strength C	Strength F
Field	Penetration	SPT	Lithostatic	—	—	$N \to V_S \to G_0$	—	ϕ'	—
		CPT	Lithostatic	—	—	$q_c \to V_S \to G_0$	—	ϕ'	c_u
	Geophysical	Down-Hole	Lithostatic	$<10^{-3}$	10–100	$V_S \to G_0$	—	—	—
		Cross-Hole	Lithostatic	$<10^{-3}$	10–100	$V_S \to G_0$	possible	—	—
		SASW	Lithostatic	$<10^{-3}$	10–100	$V_R \to V_S \to G_0$	—	—	—
Laboratory	Cyclic	Triaxial	Axisymmetric	$>10^{-2}$	0.01–1	$q:\varepsilon_a \to E \to G$	$W_D/W_S \to D$	$q/\sigma'_r : N_c$	
		Simple shear	Axisymmetric	$>10^{-2}$	0.01–1	$\tau:\gamma \to G$	$W_D/W_S \to D$	$\tau/\sigma'_v : N_c$	
		Torsional shear	Axisymmetric or true triaxial	10^{-4}–1	0.01–1	$\tau:\gamma \to G_0, G$	$W_D/W_S \to D$	—	—
	Dynamic	Resonant column	Axisymmetric or true triaxial	10^{-4}–1	> 10	$f_r \to G_0, G$	H.p., R.f. $\to D$	—	—
		Bender elements	Axisymmetric	$< 10^{-3}$	> 100	$V_S \to G_0$	—	—	—

Legend: V_S = shear wave velocity; V_R = Rayleigh wave velocity; f_r = resonant frequency; H.p. = half-power method; R.f. = resonance factor method; N = SPT blow count; q_c = CPT tip resistance; ϕ' = friction angle in effective stresses; c_u = undrained shear strength; C = coarse-grained, F = fine-grained soils; q/σ'_r = deviator/radial stress ratio; τ/σ'_v = shear/vertical stress ratio; N_c = number of cycles.

پارامترهای دینامیکی

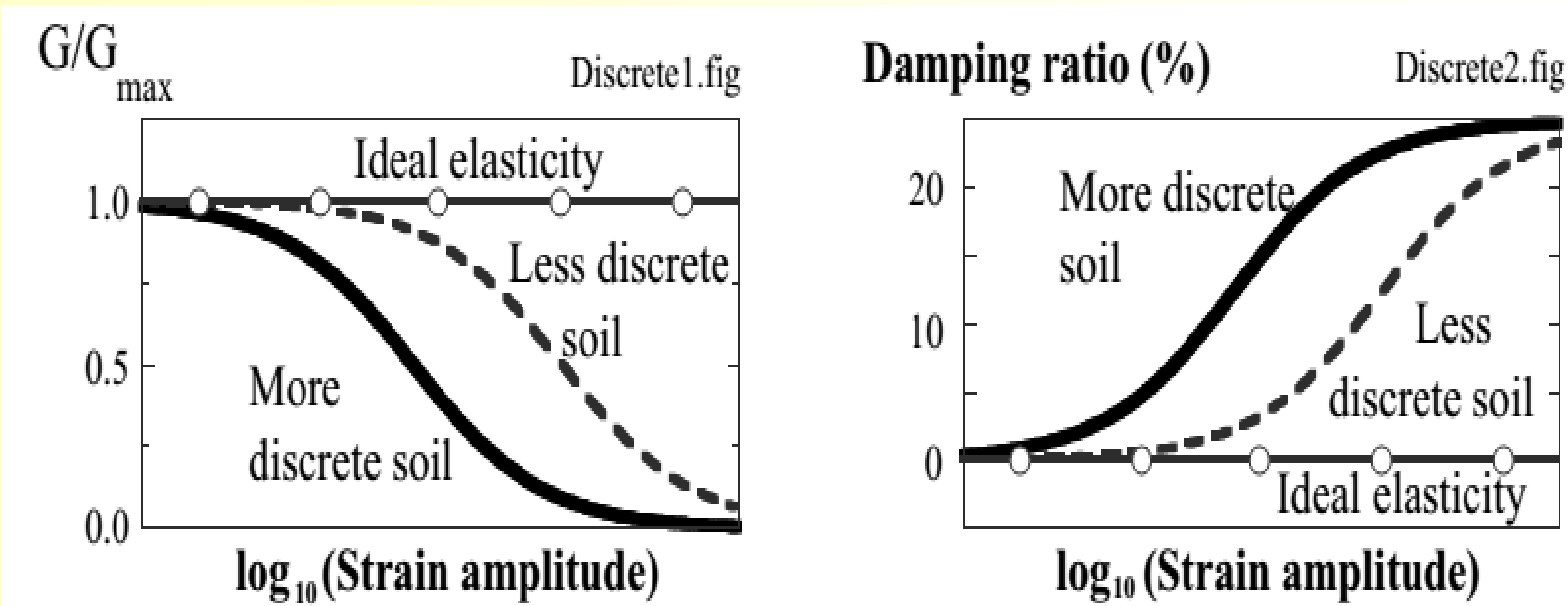


پارامترهای دینامیکی

	Relative Quality of Test Results				
	Shear modulus	Young's modulus	Material damping	Effect of number of cycles	Attenuation
Resonant column	Good	Good	Good	Good	-
with application	-	-	-	-	Fair
Ultrasonic pulse	Fair	Fair	-	-	Poor
Cyclic triaxial	-	Good	Good	Good	-
Cyclic simple shear	Good	-	Good	Good	-
Cyclic torsional shear	Good	-	Good	Good	-

a After Silver (1981)

پارامترهای دینامیکی



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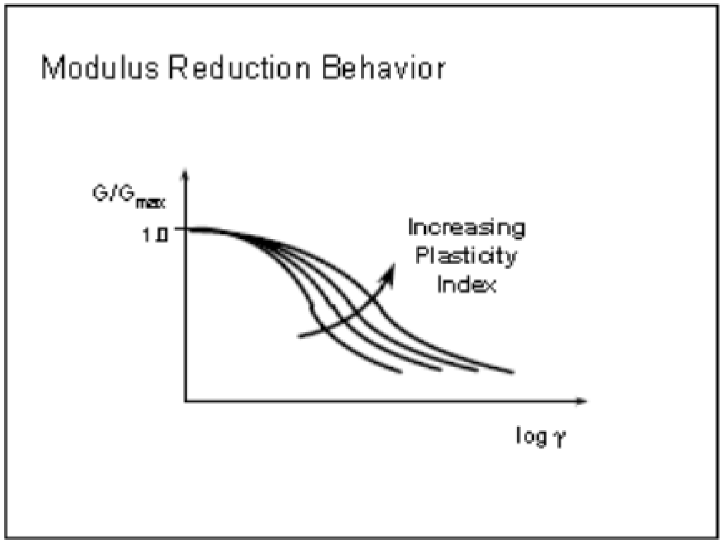

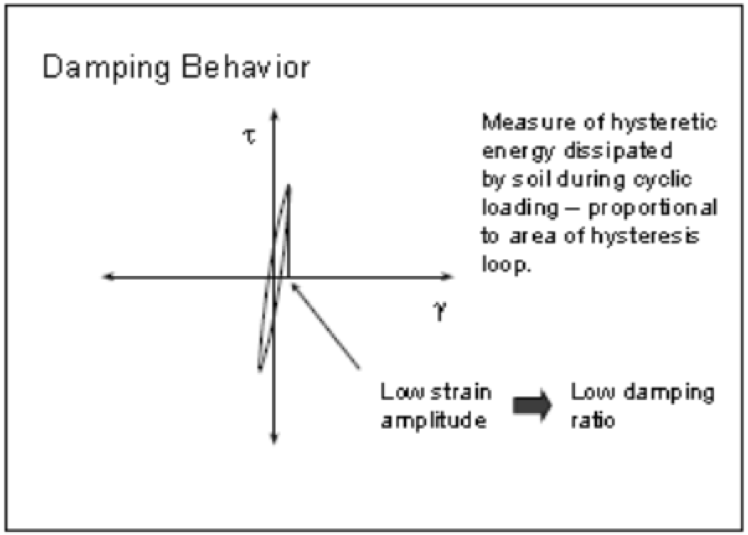

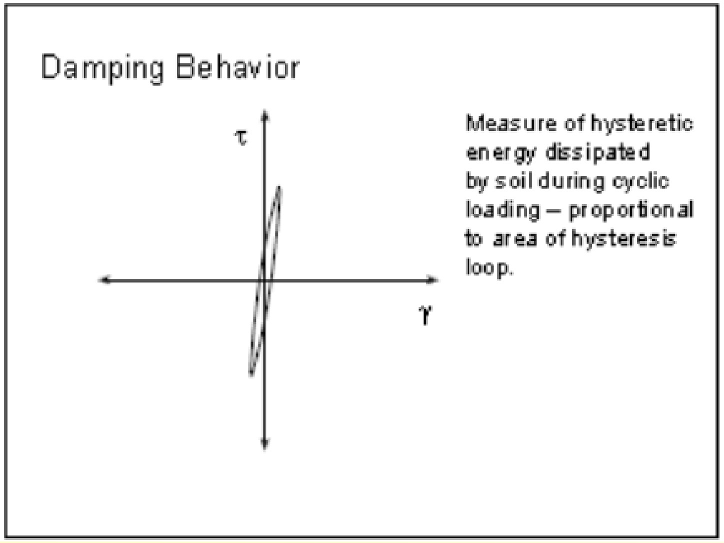

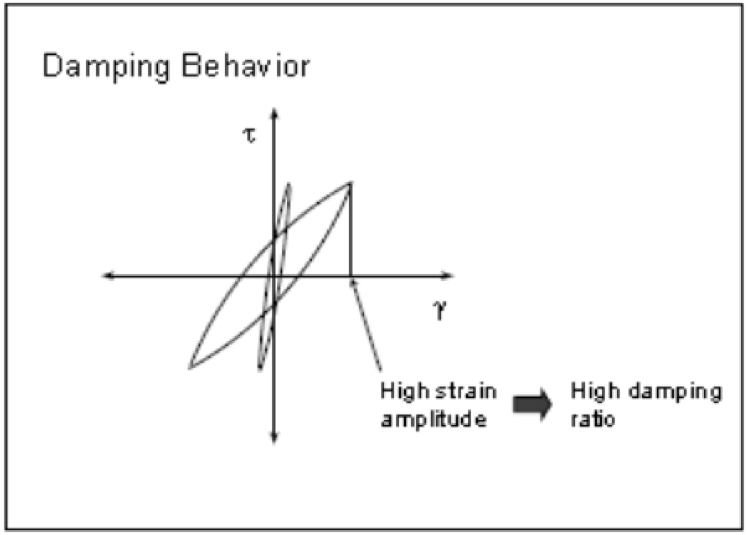

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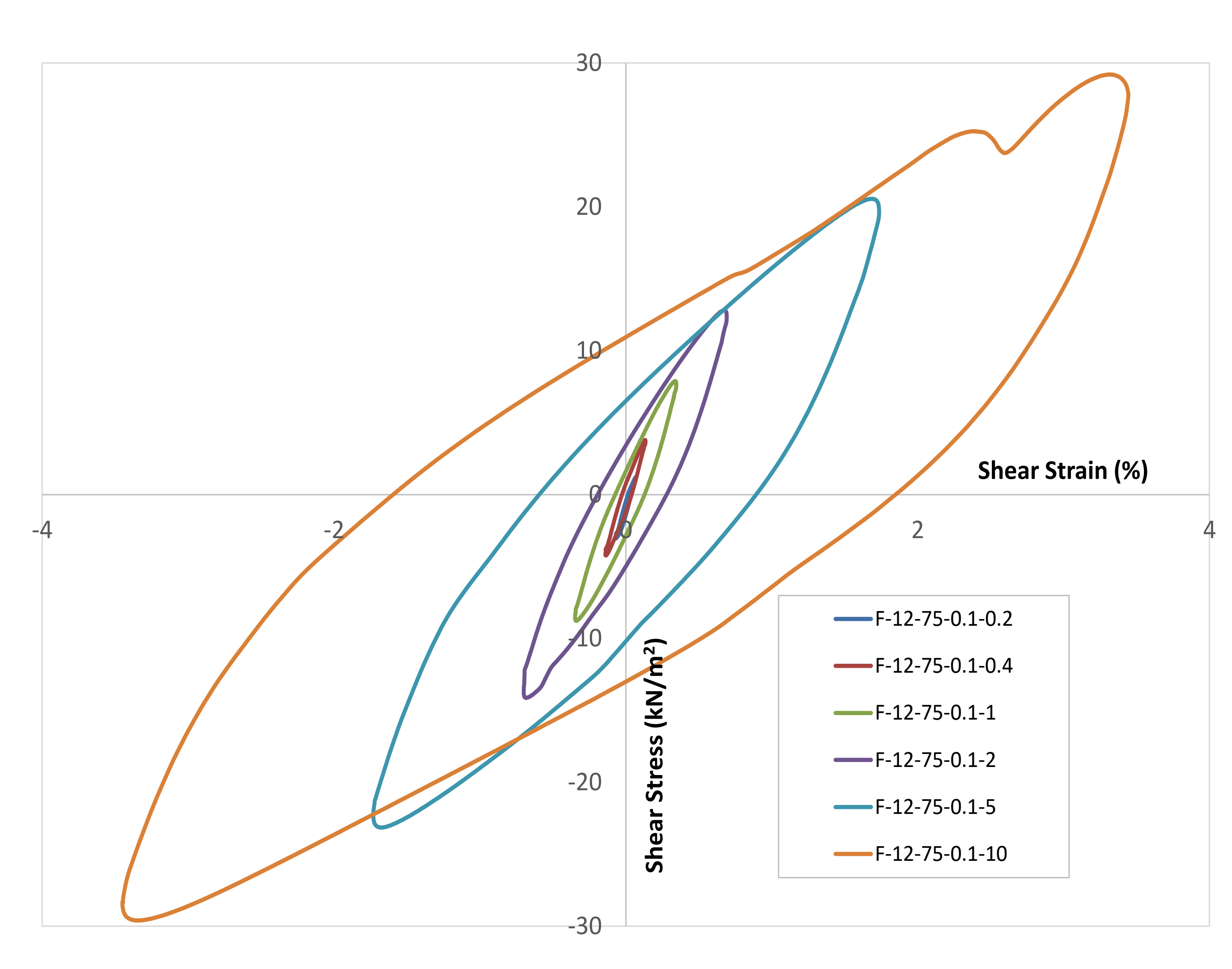

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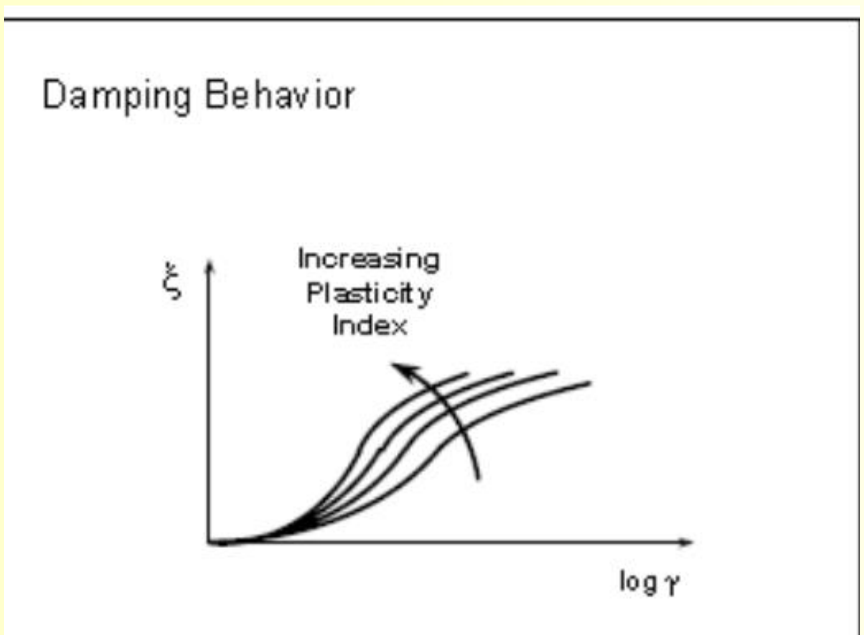

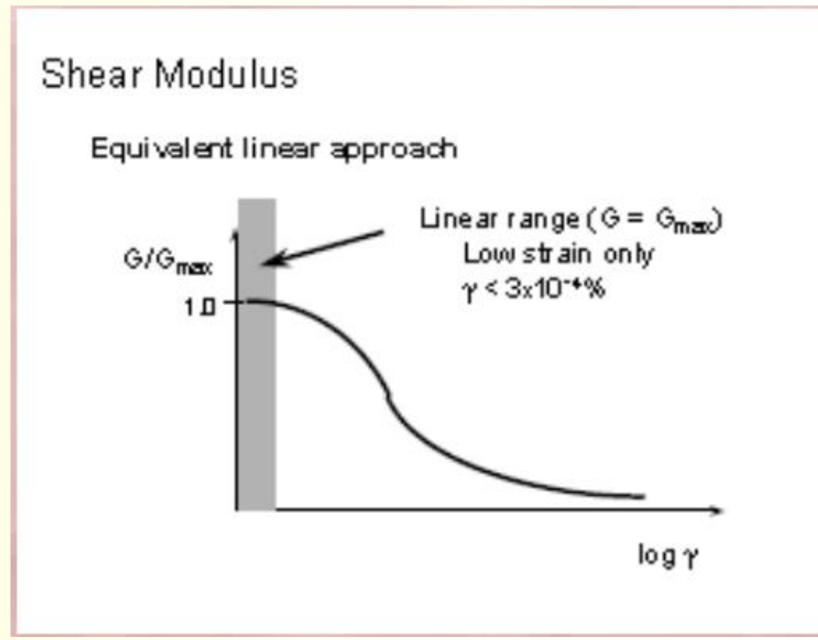

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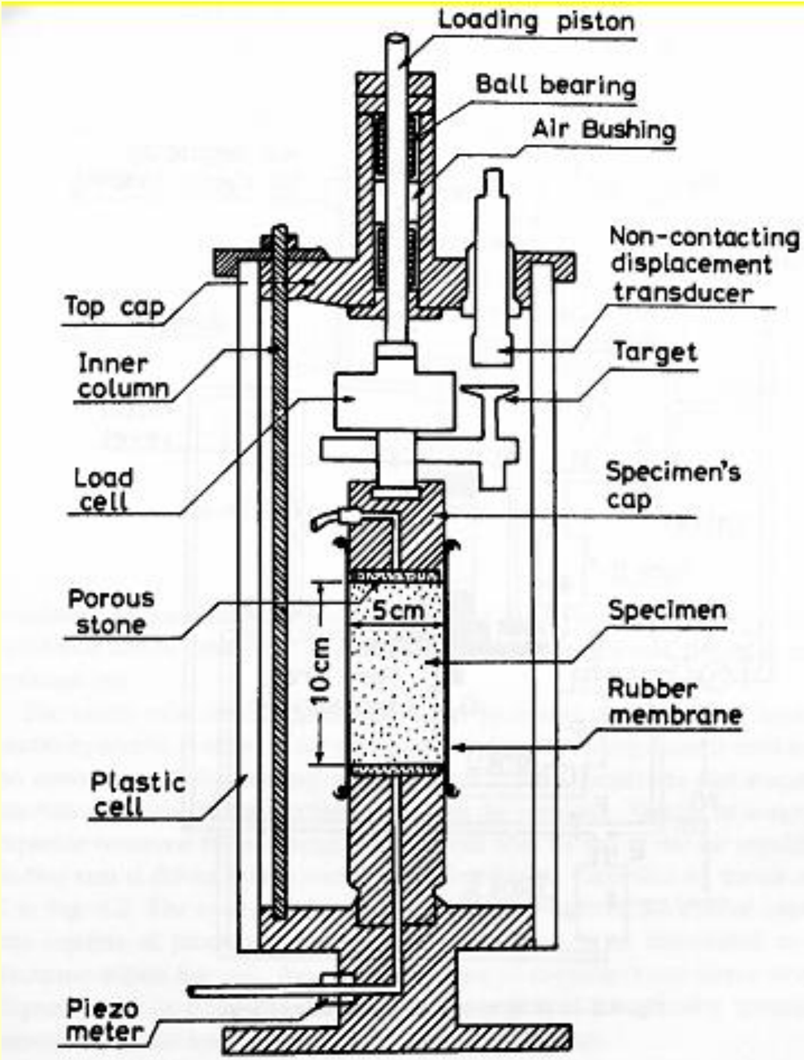

- تنش کنترل: 50 kPa +-
- کرنش کنترل: 10 mm +-
- $G = E/2(1+\upsilon)$
- $\upsilon = -\varepsilon_r/\varepsilon_a$

پارامترهای دینامیکی

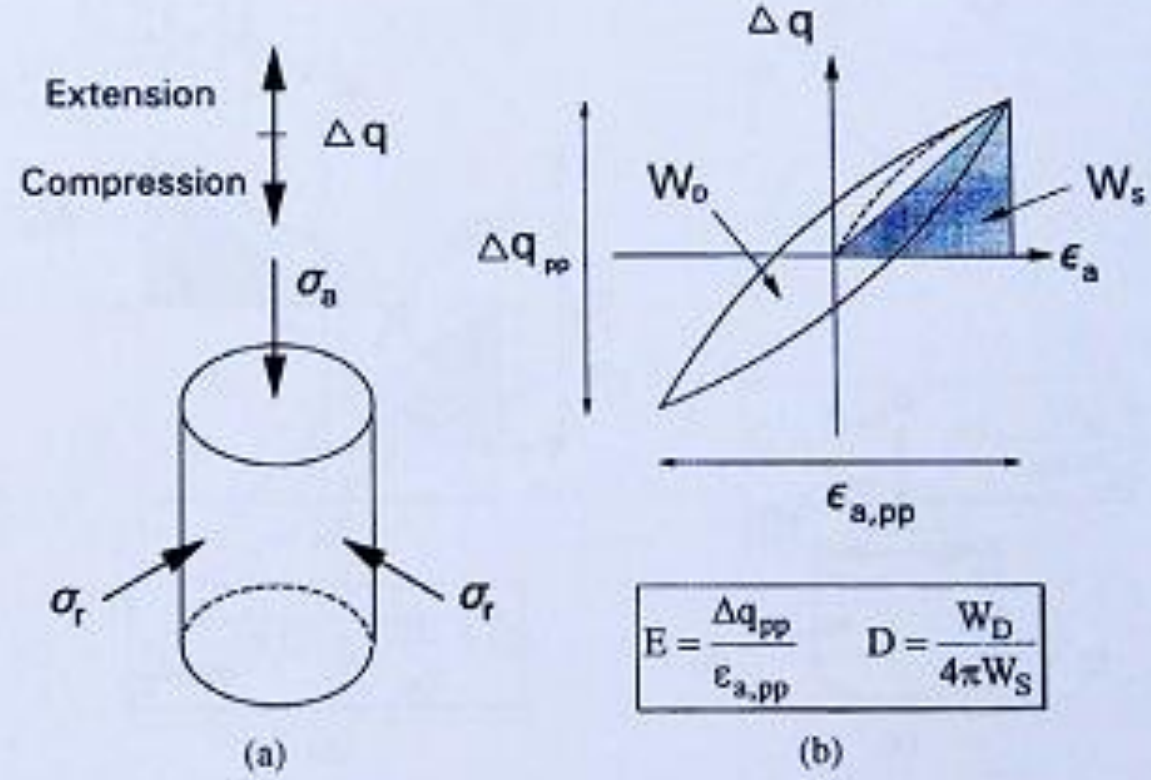

Fig. T4.12. Cyclic triaxial test.
(a) Loads on soil specimen.
(b) Interpretation.

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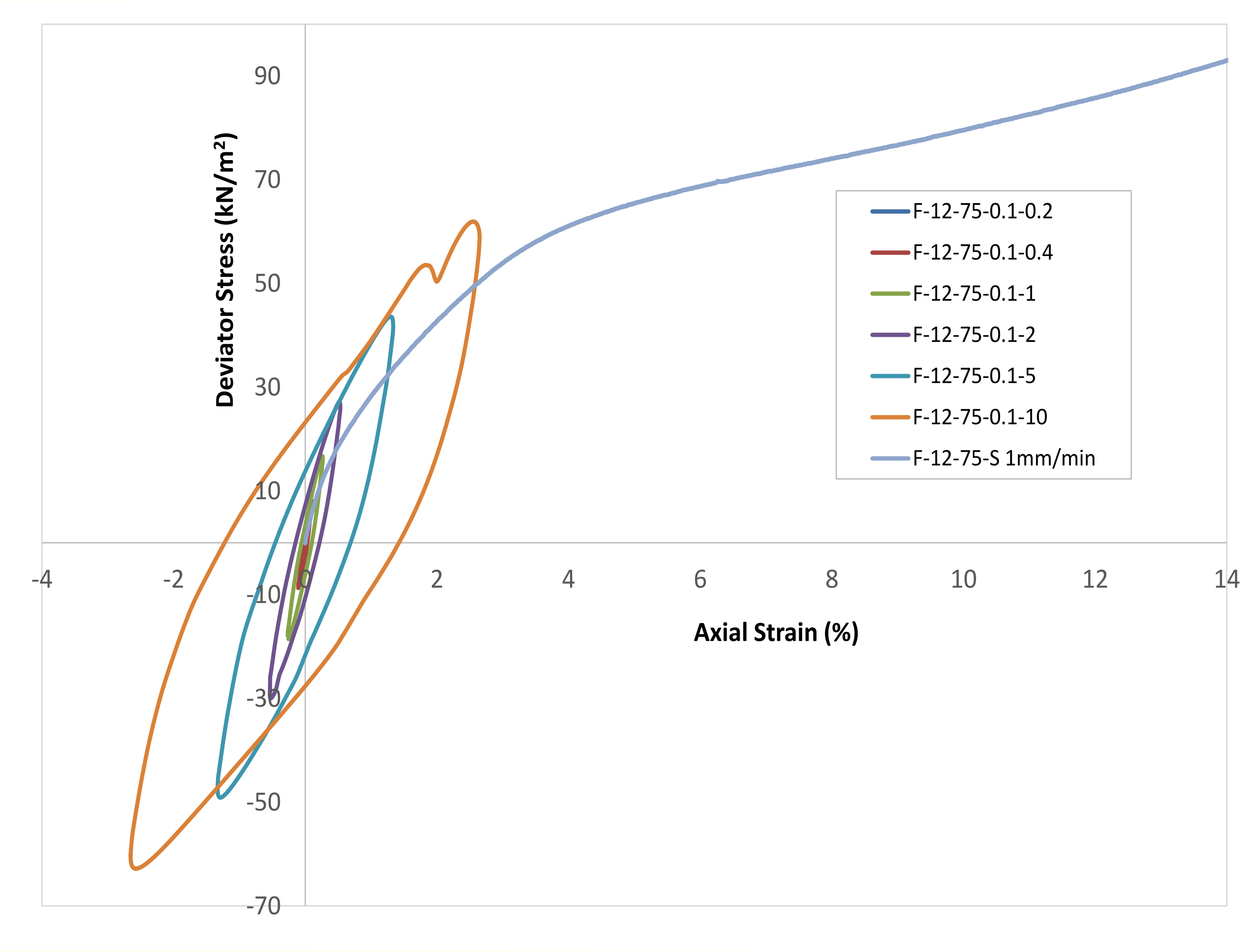

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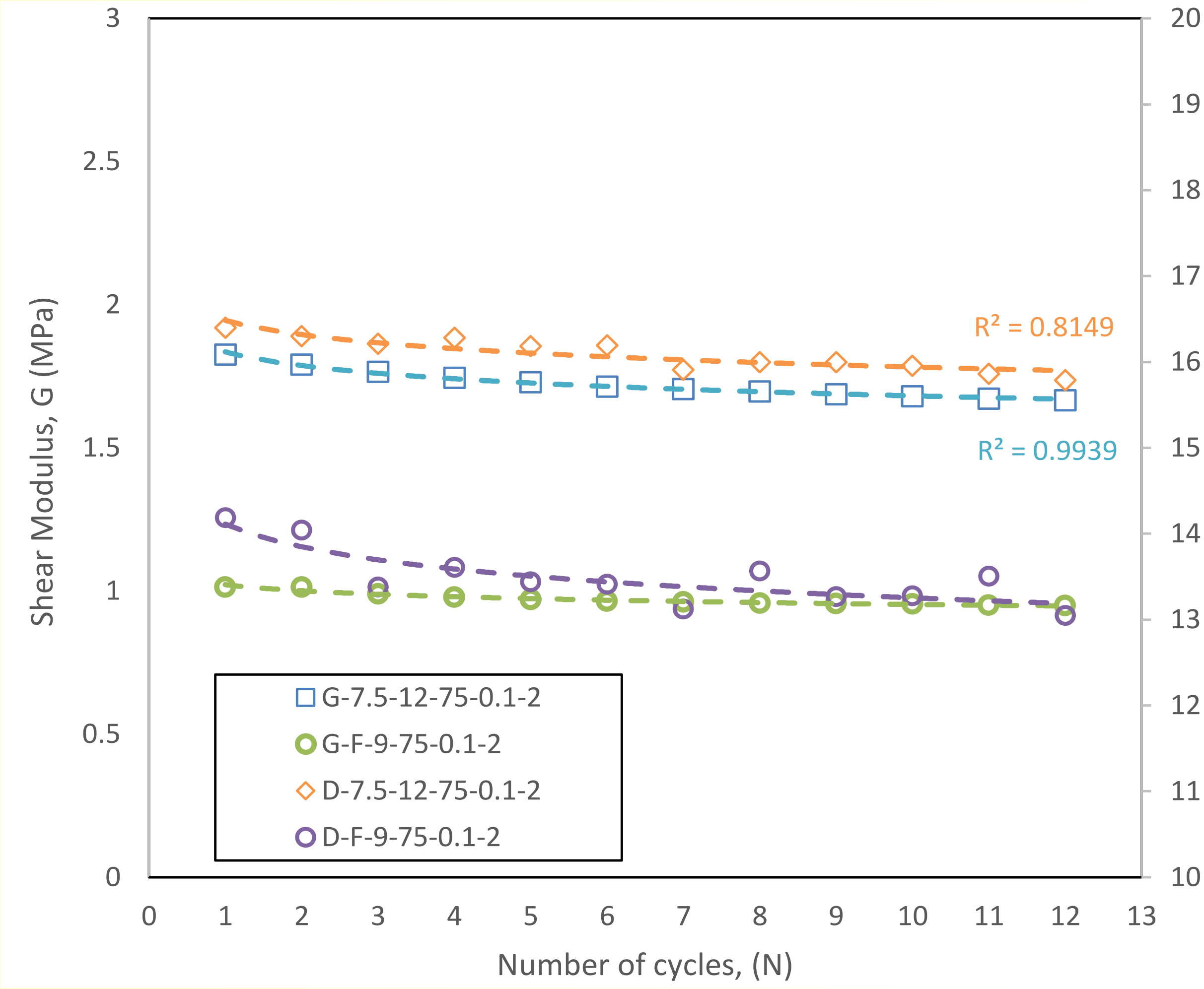

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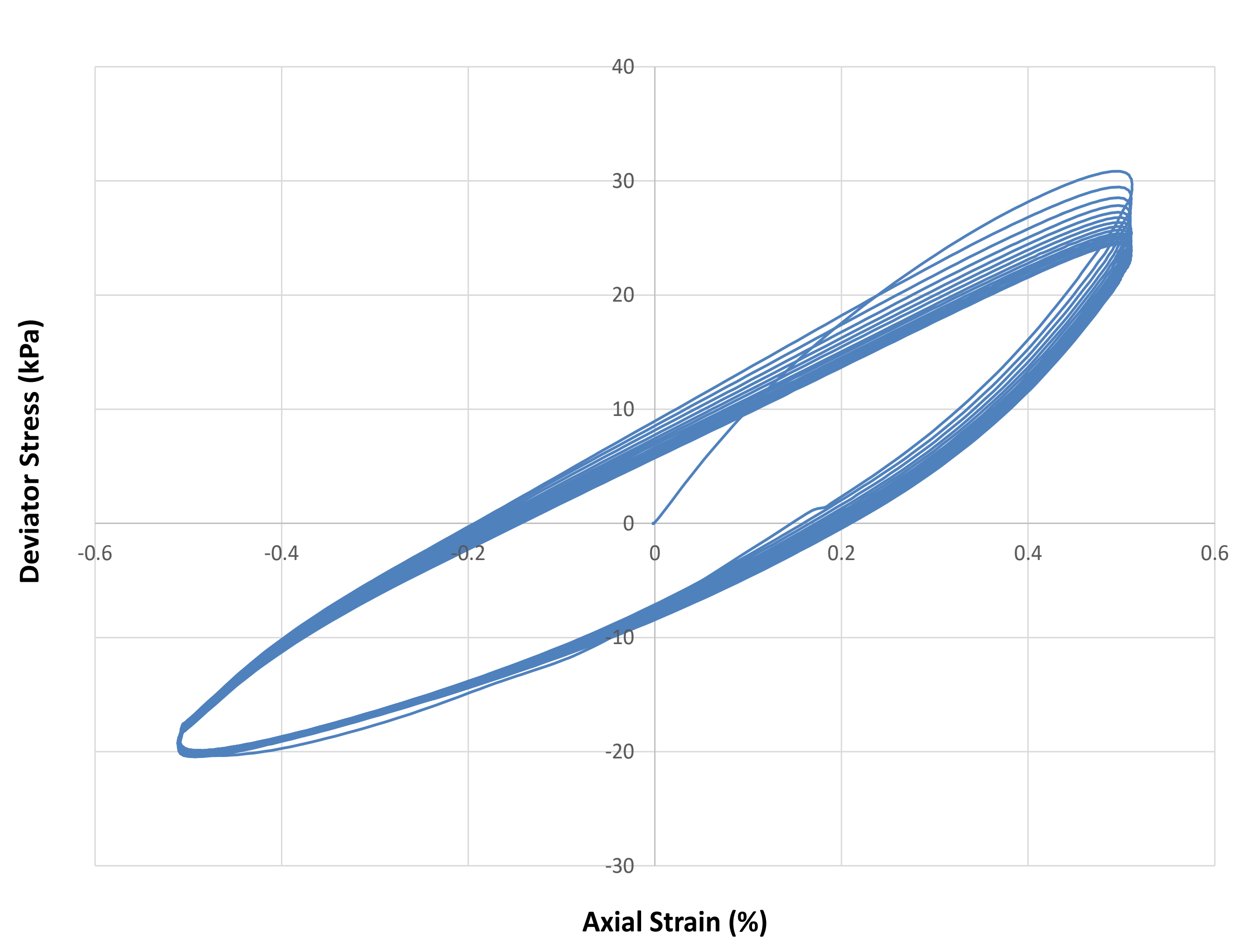

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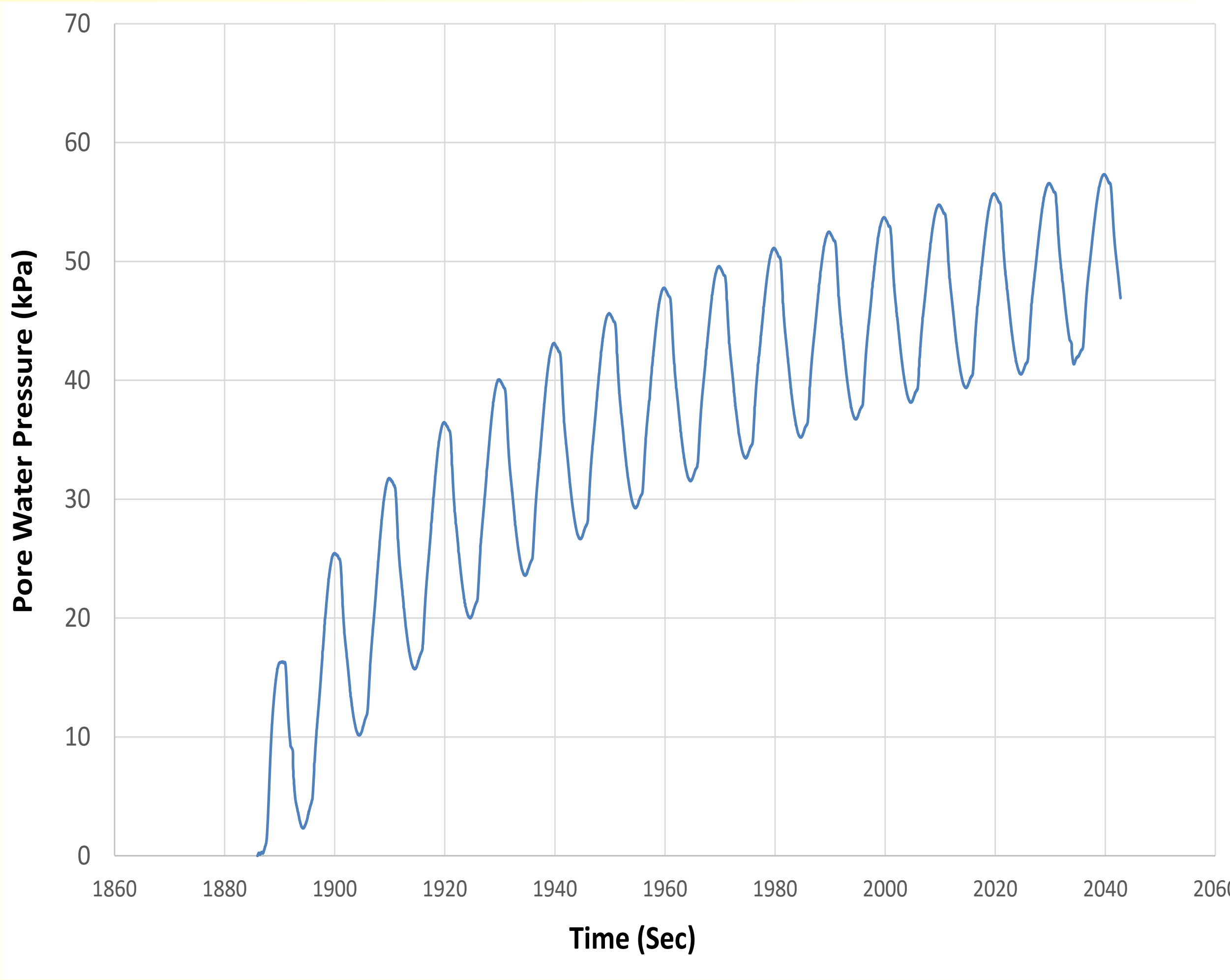

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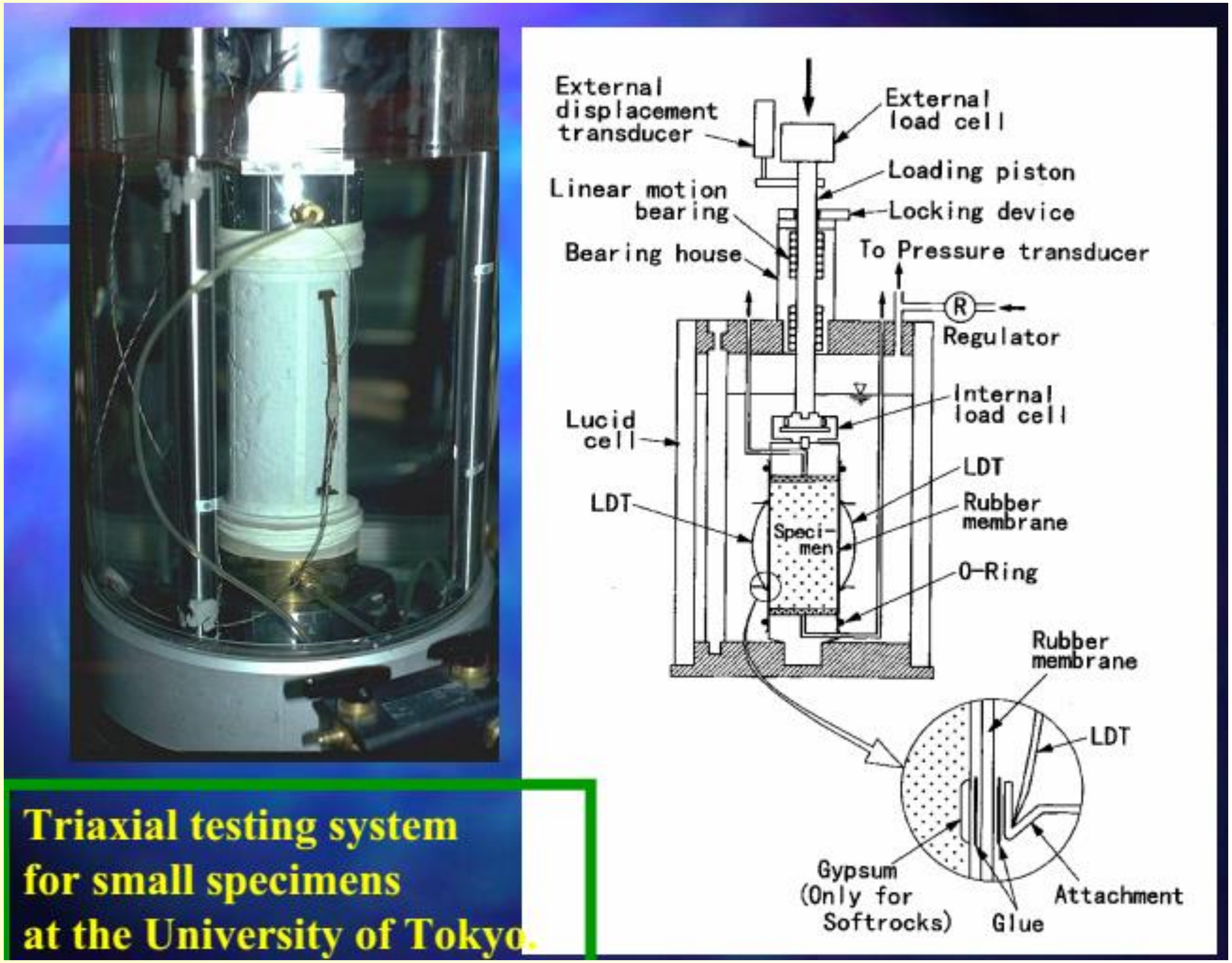

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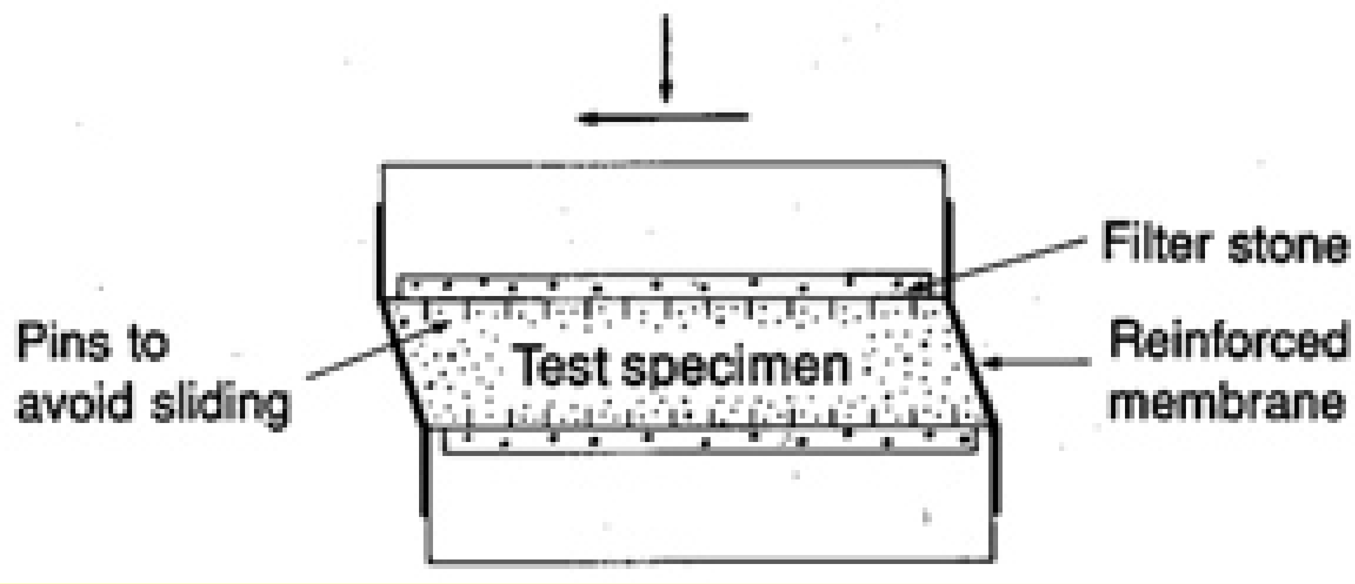

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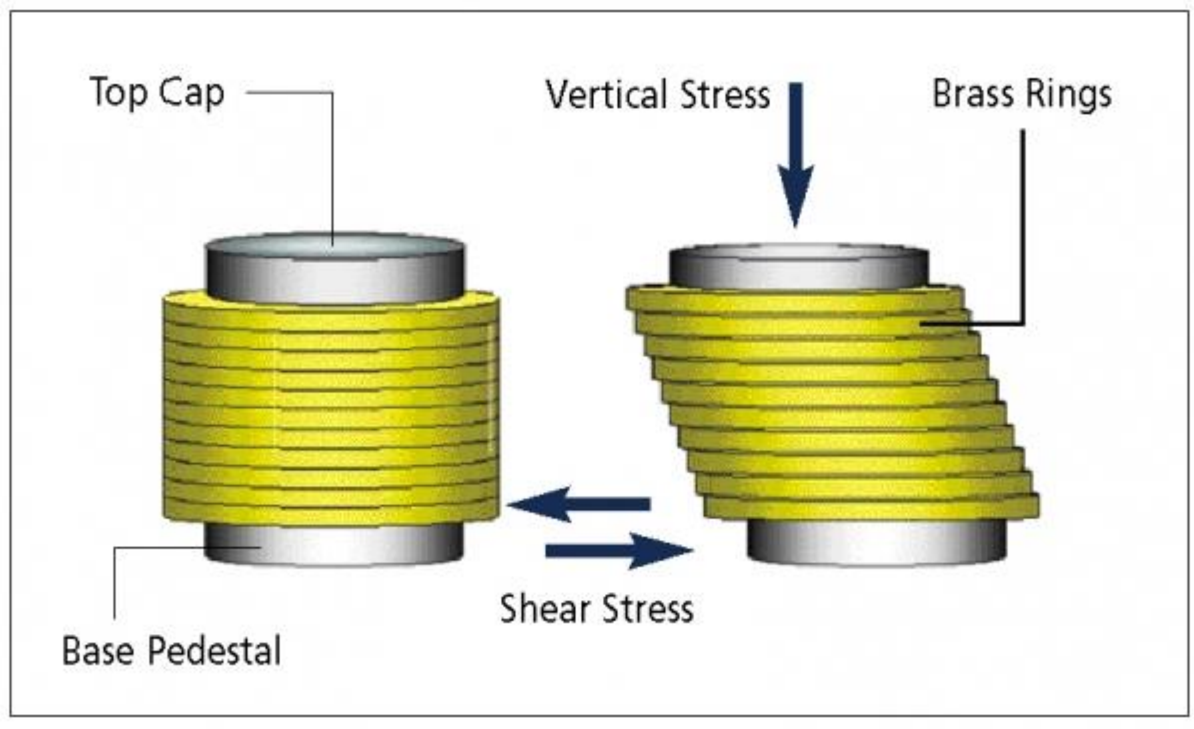

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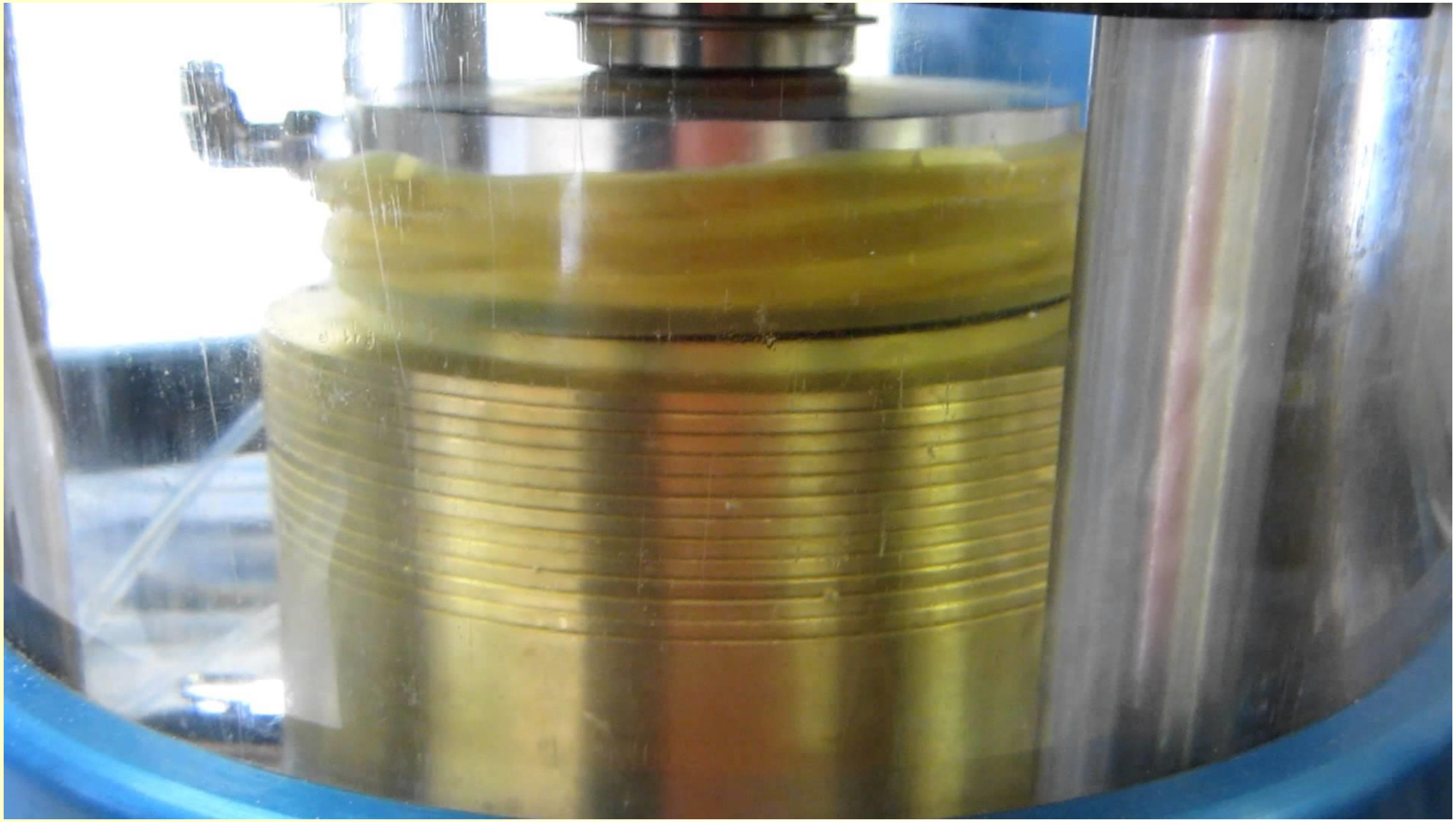

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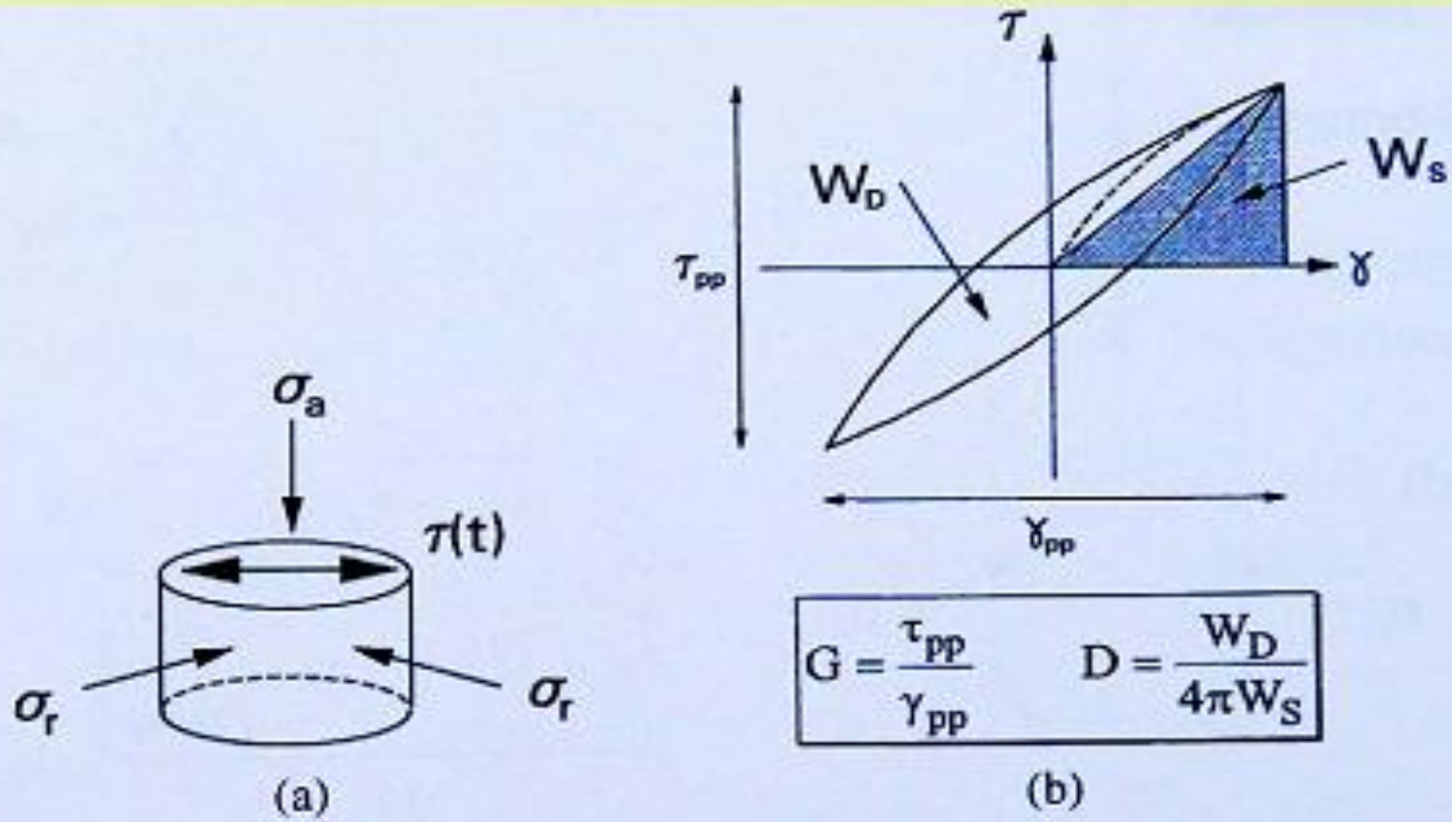
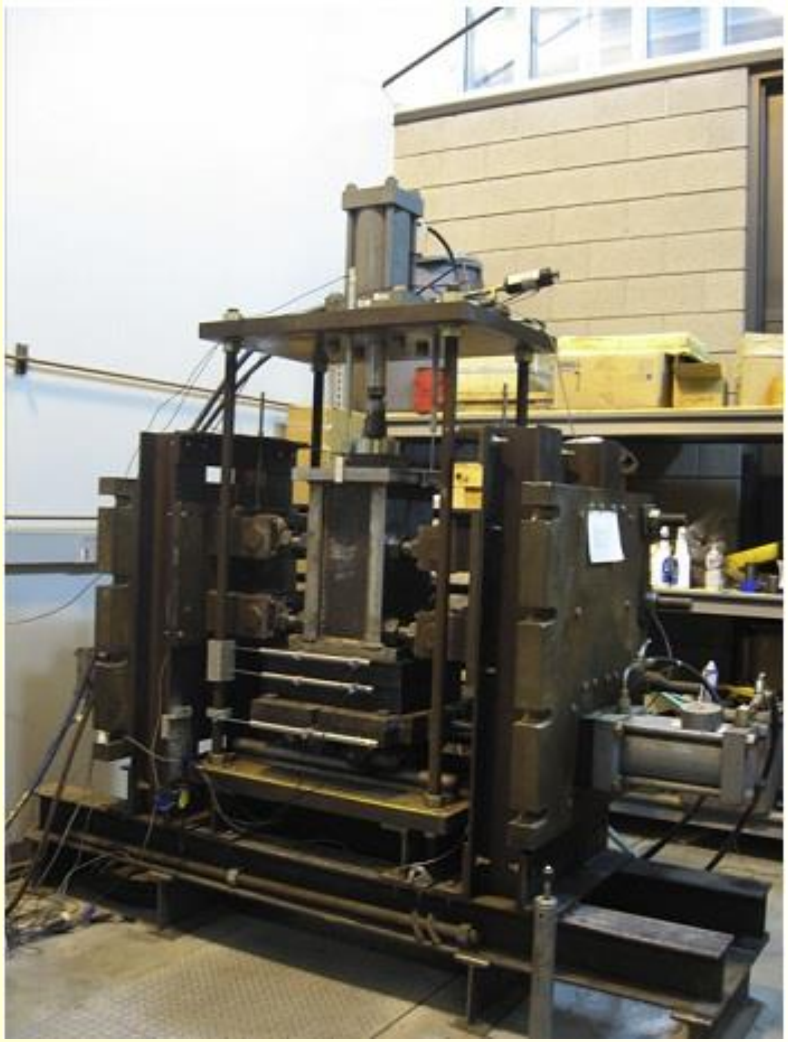


Cyclic simple shear test.
(a) Loads on soil specimen.
(b) Interpretation.

پارامترهای دینامیکی



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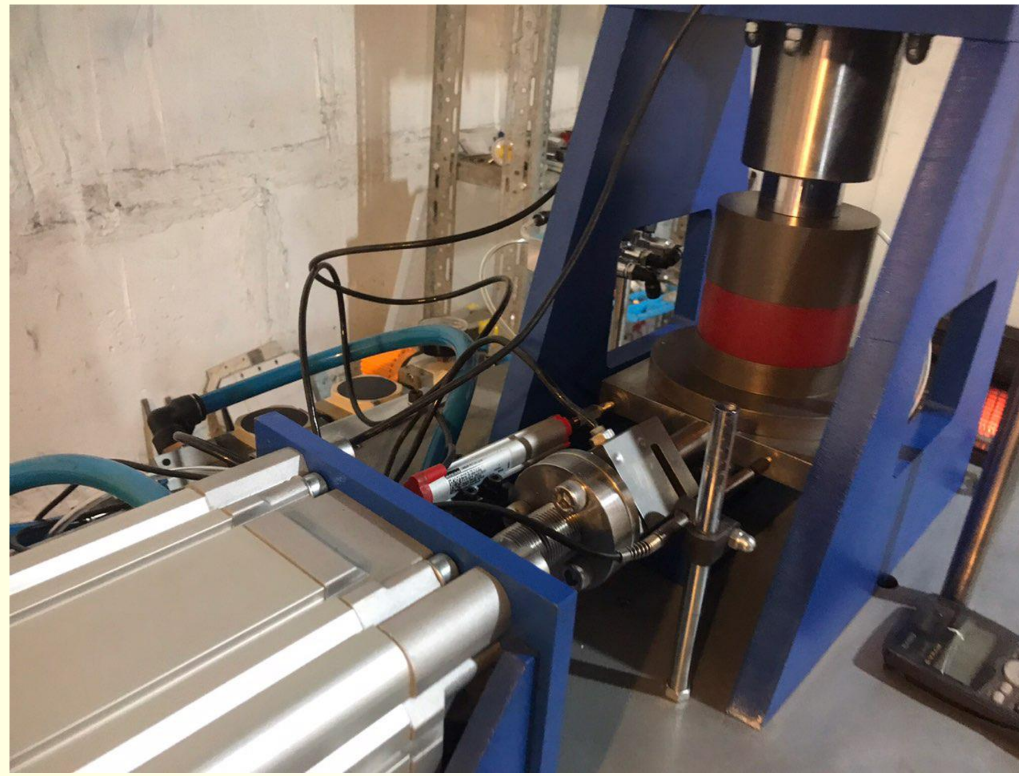

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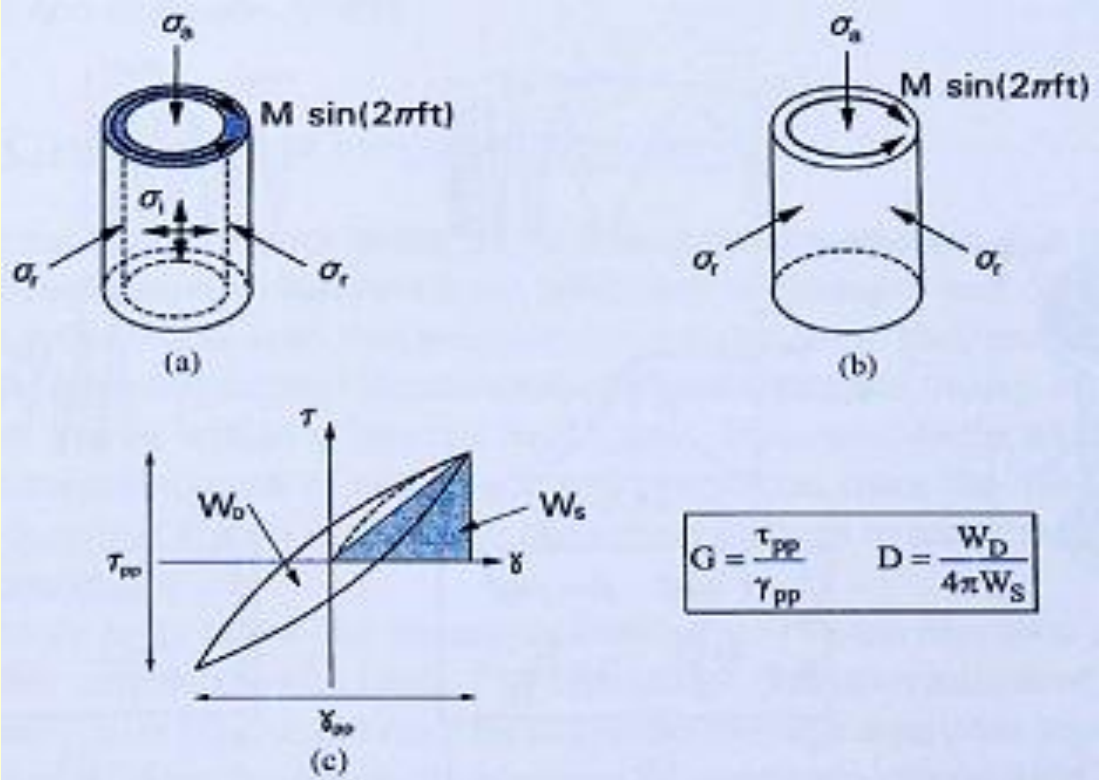


Cyclic torsional shear test.
(a) Loads on hollow cylinder specimen.
(b) Loads on solid cylinder specimen.
(c) Interpretation.

پارامترهای دینامیکی

- عدم یکنواخت بودن تنش برشی در جهت شعاعی
- در صورت توخالی بودن جداره این عدم یکنواختی کمتر می شود

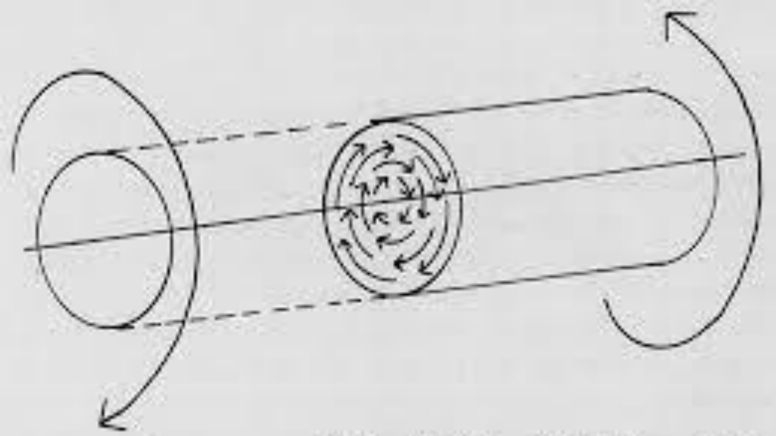
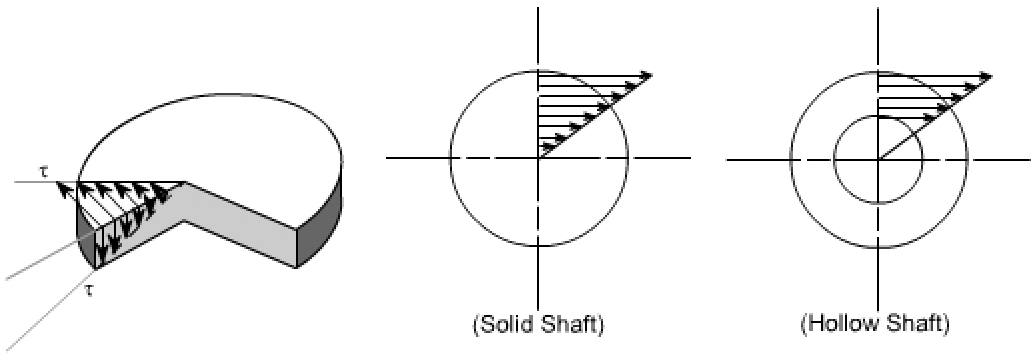


FIG. 12-14 Cross section of the cylinder loaded in Figure 12-6, E in torsion shows the shear stress distribution about the neutral axis. Shear stress increases as a function of distance from the neutral axis.



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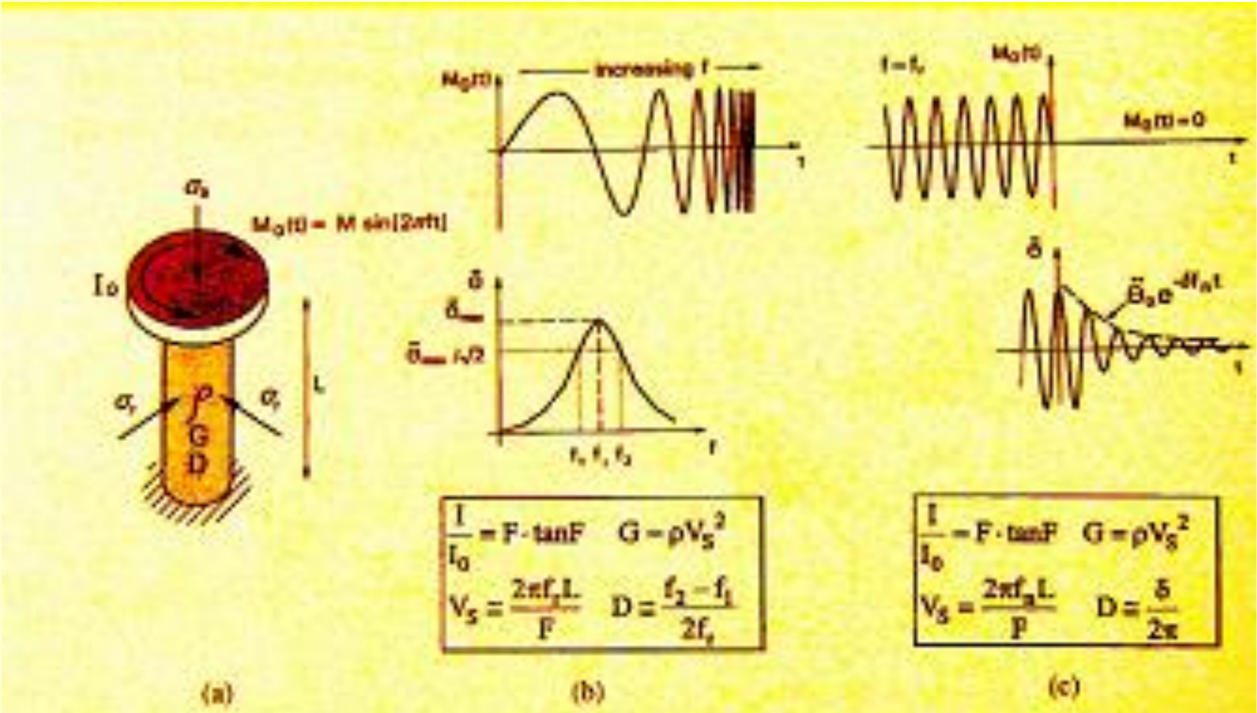
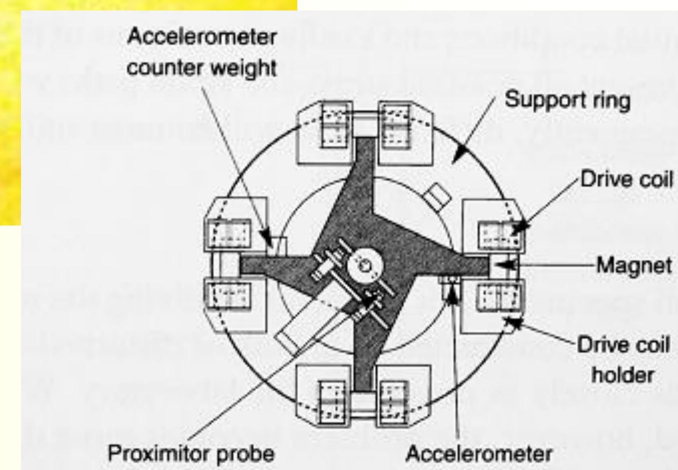


Fig. T4.15. Resonant column test.
(a) Loads on soil specimen.
(b) Interpretation of resonance test.
(c) Interpretation of free vibration decay test.



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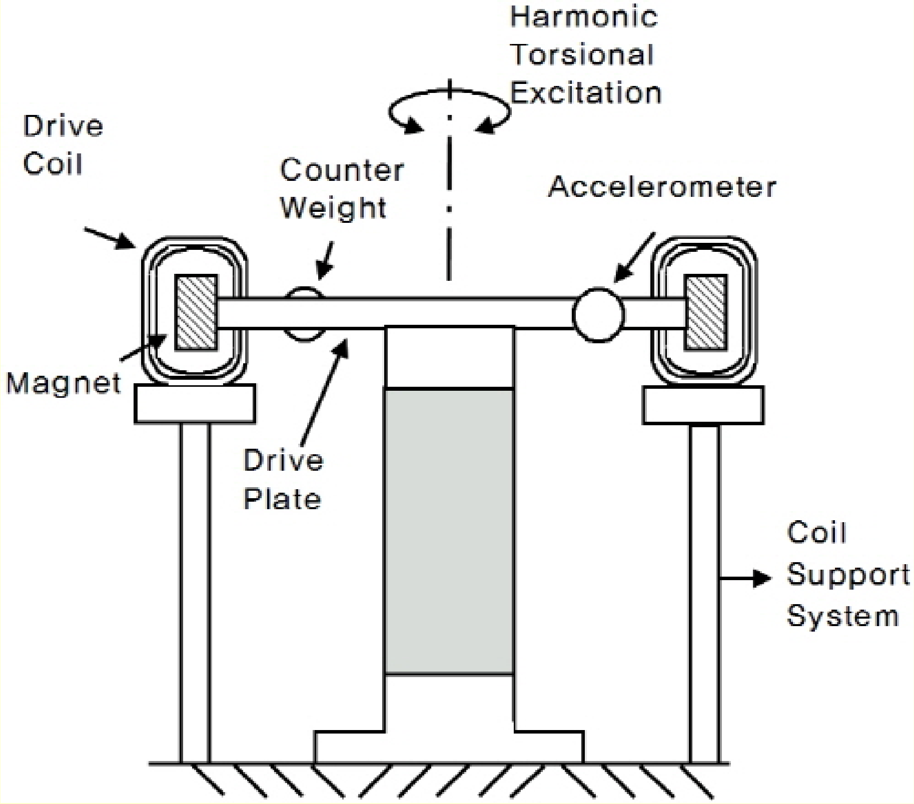
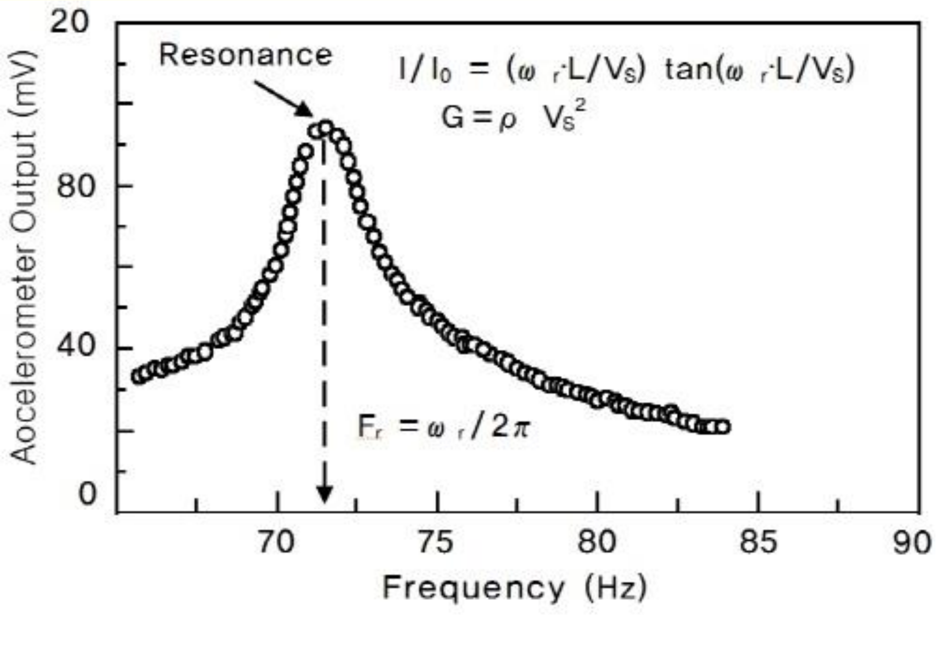
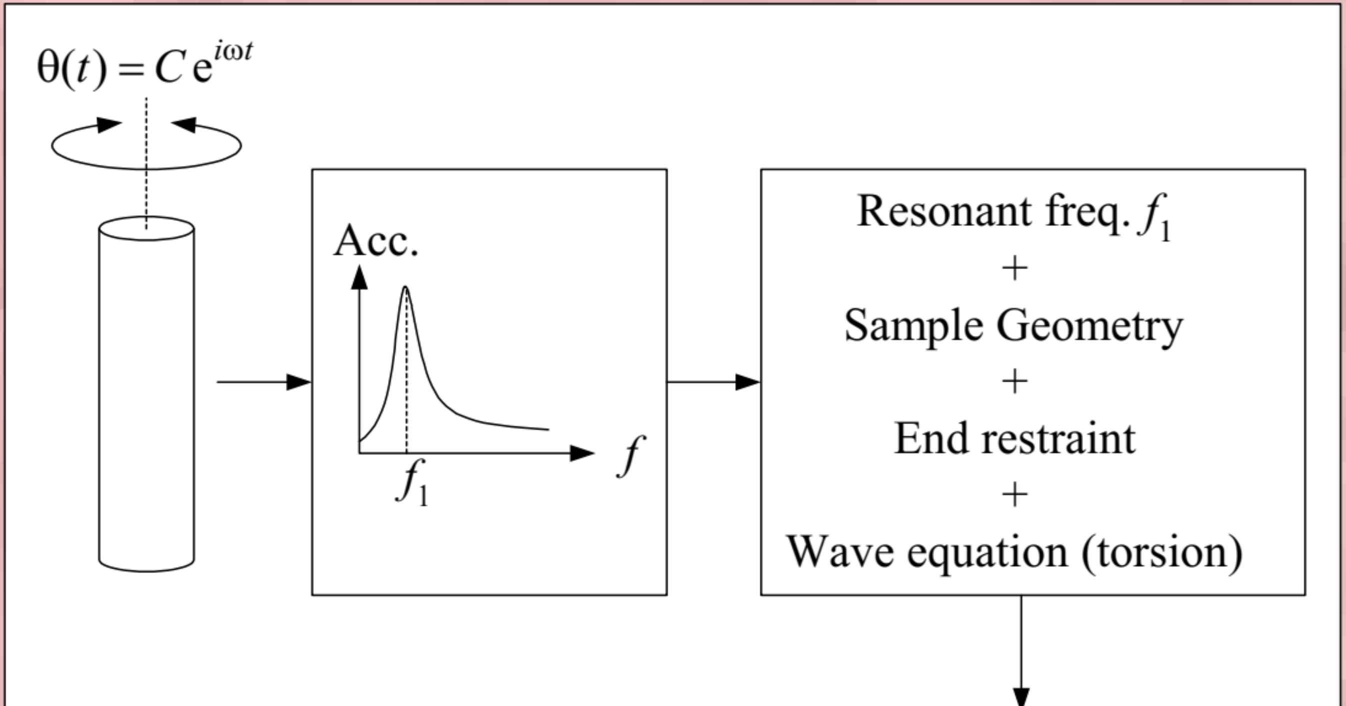




پارامترهای دینامیکی

- **Resonant Column Test**
- Principle in determining G_0, ξ_0, E
- 1) The column specimen is **prepared** and **consolidated**
- 2) The **frequency** of the electromagnetic drive system is gradually increased until the **first mode resonant condition** is encountered
- 3) With known value of the resonant frequency it is possible to back-calculate the **velocity** (v_s or v_l) of the wave propagation and thereby **G_0** or **E**
  - With account of sample geometry and conditions of end restrain
- 4) After measuring the resonant condition, the drive system is cut of and the specimen is brought to a state of **free vibration**. ξ_0 is determined by observing the **decay pattern**

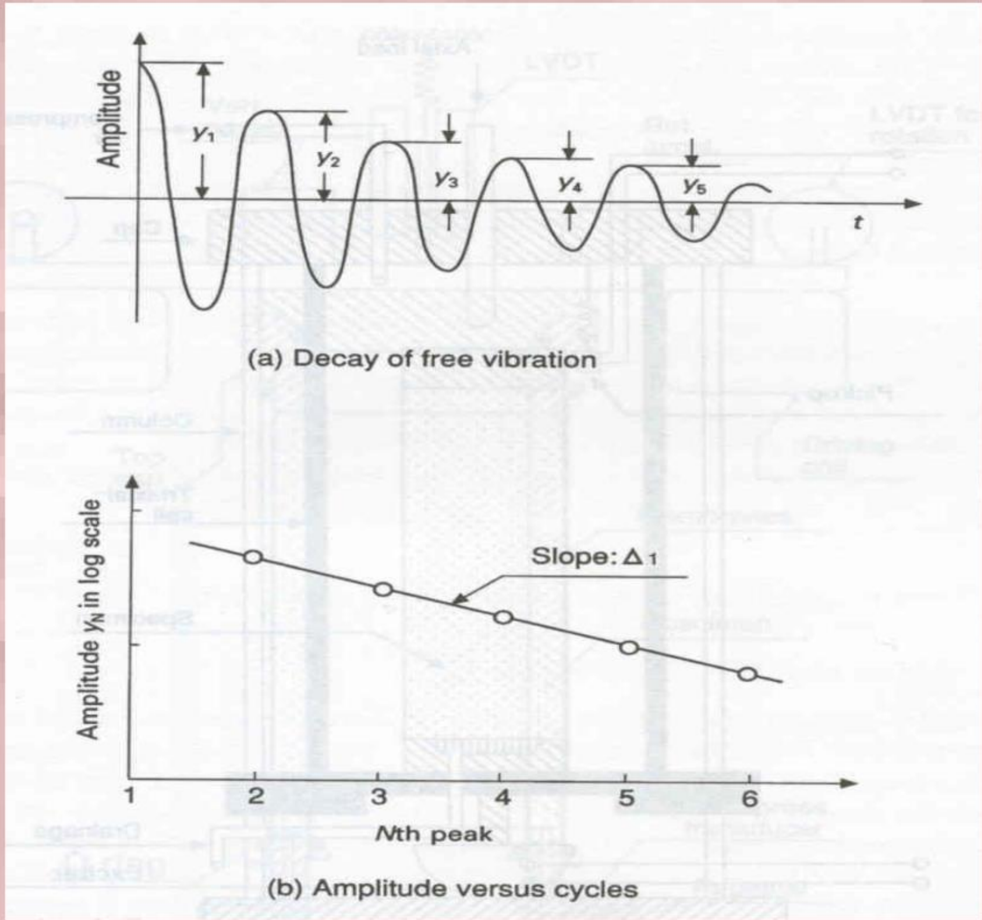
- **Resonant Column Test**
- Principle in determining G_0 (E)



$$G_0 = \rho v_s^2 = \rho(2\pi H)^2\left(\frac{f_1}{F_T}\right)^2$$

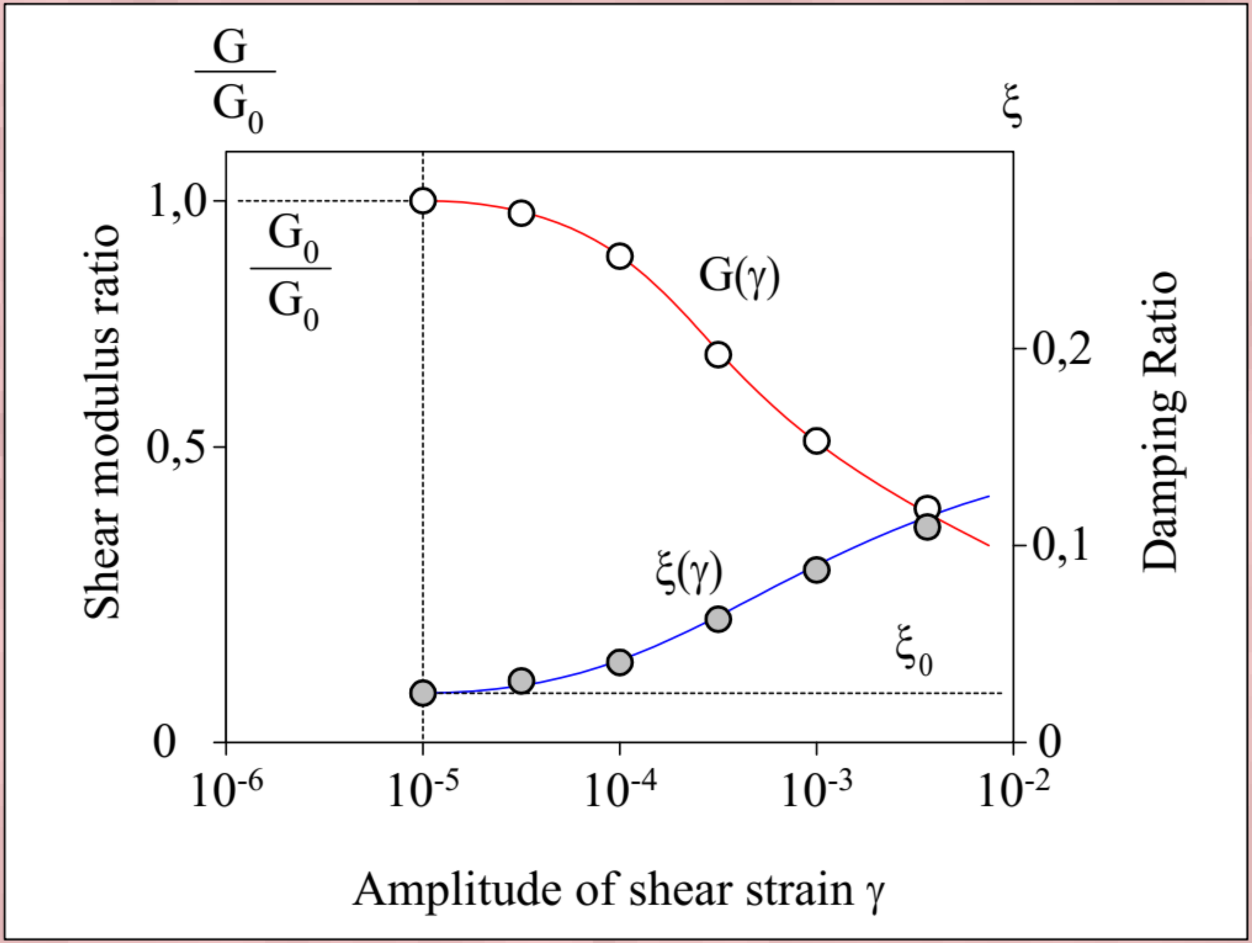
پارامترهای دینامیکی

- **Resonant Column Test**
- Principle in determining ξ_0 ($\xi_0 = 1/2\pi \cdot \Delta_1$)



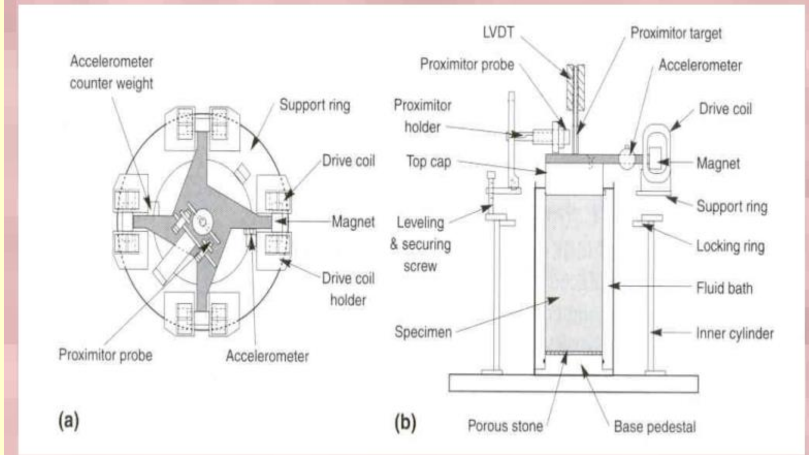
پارامترهای دینامیکی

- **Resonant Column Test**
- Principle in determining G and ξ



پارامترهای دینامیکی

- ***Resonant Column Test***



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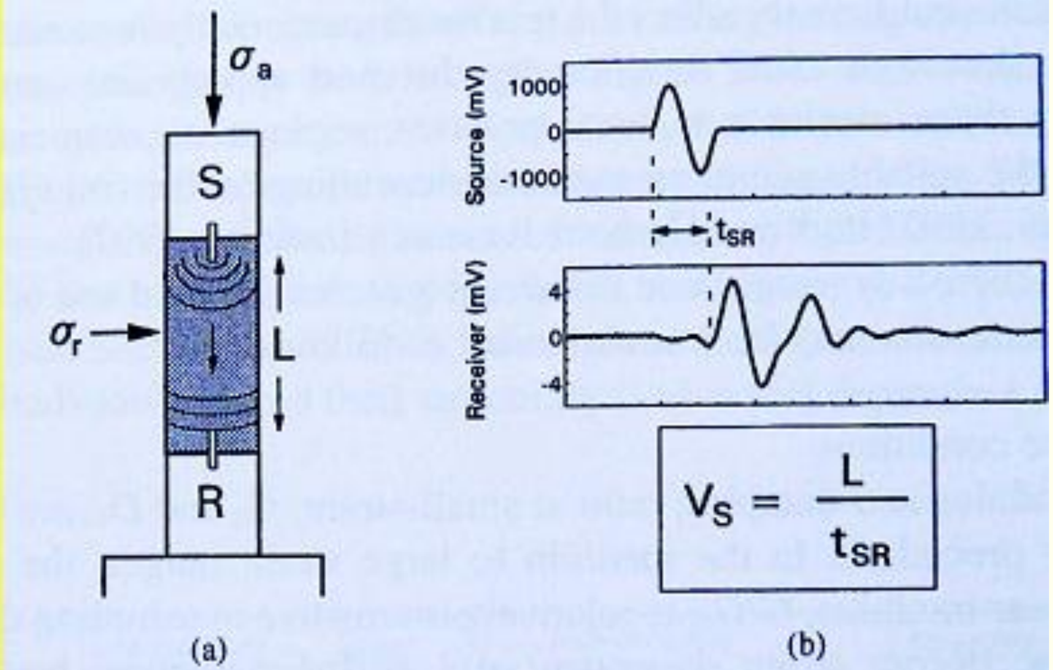
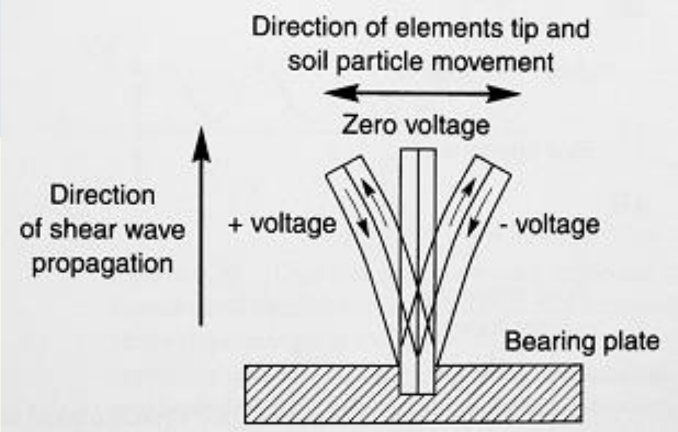


Bender element test.
(a) Loads on soil specimen.
(b) Interpretation.



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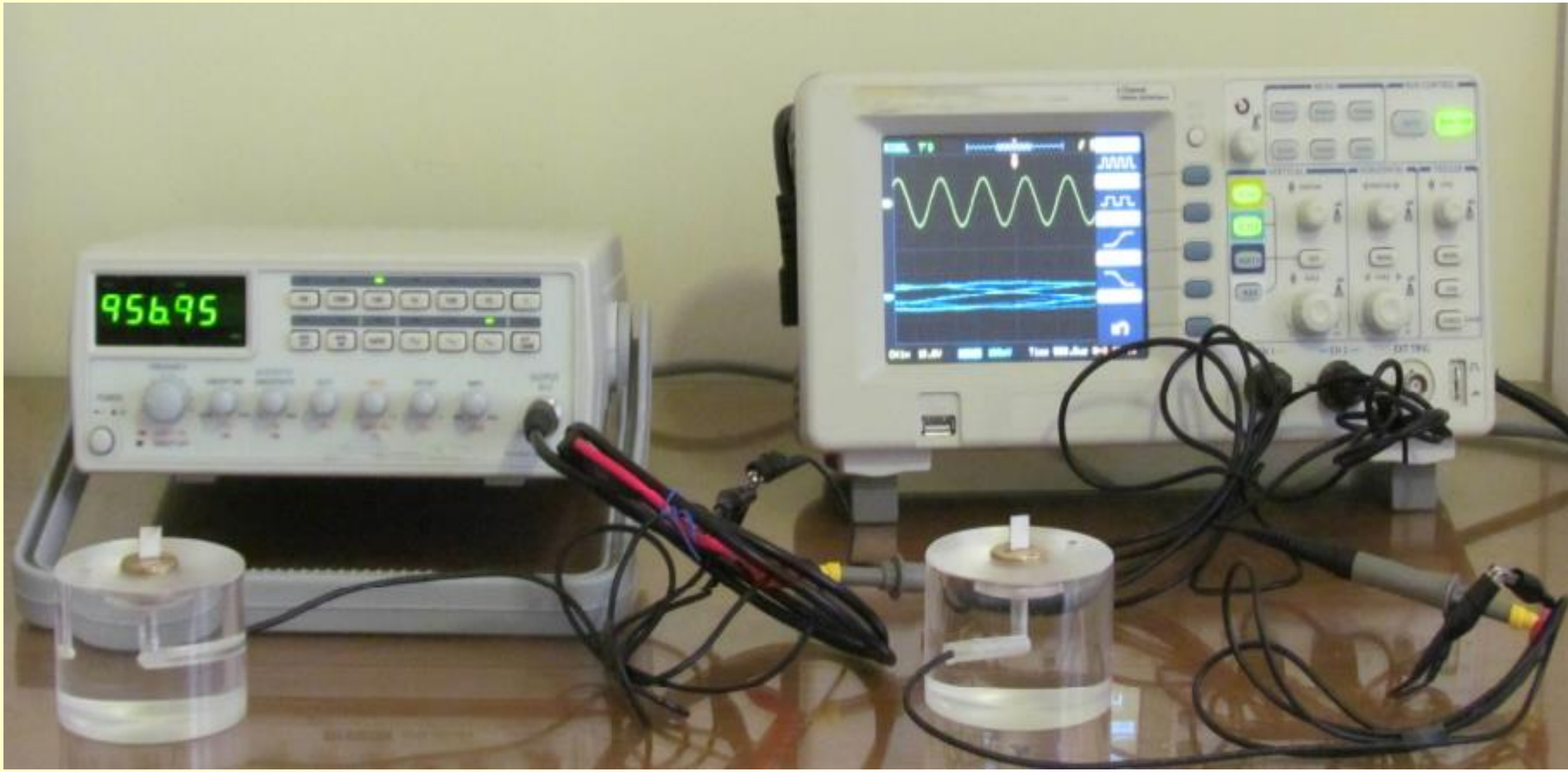

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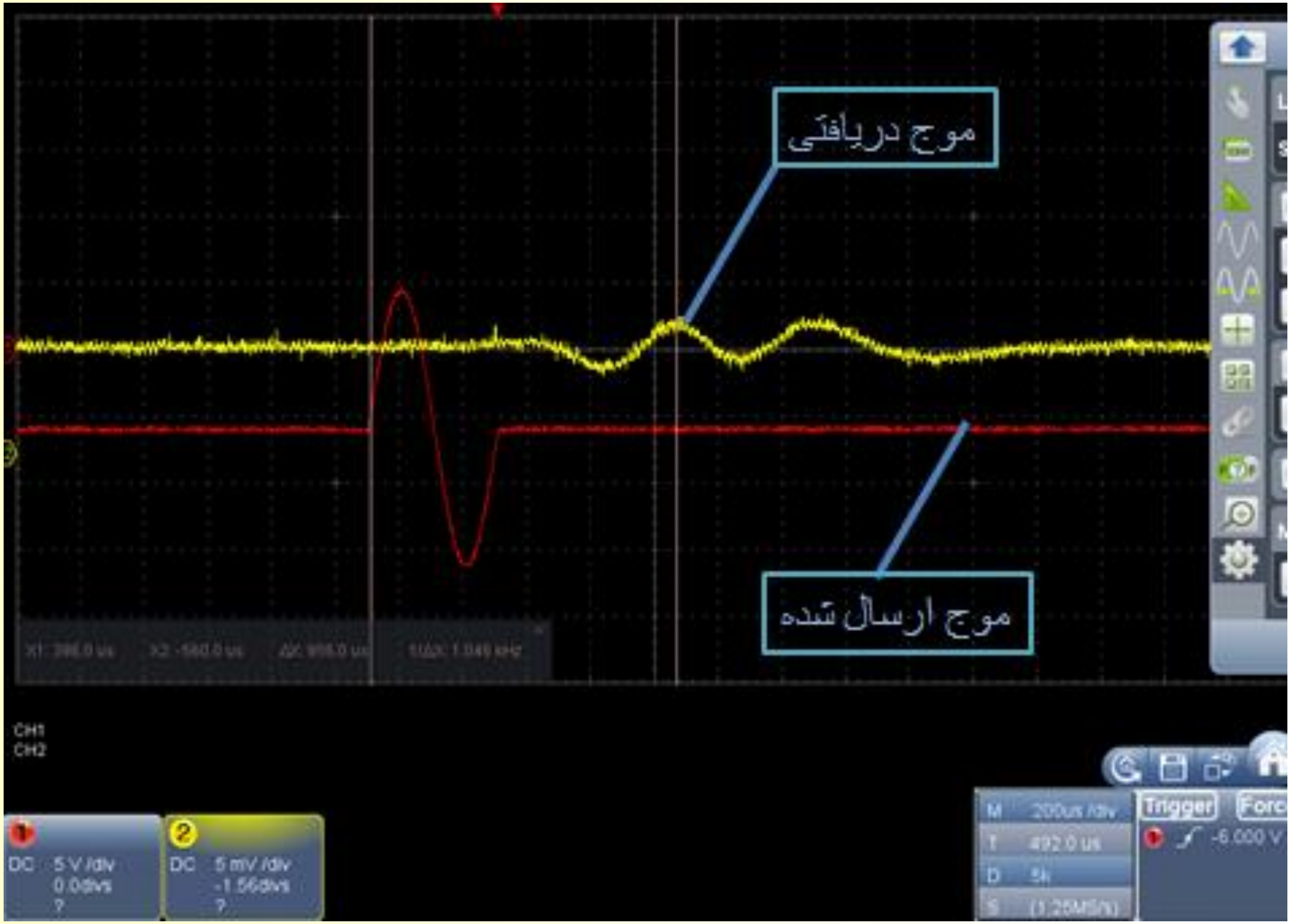

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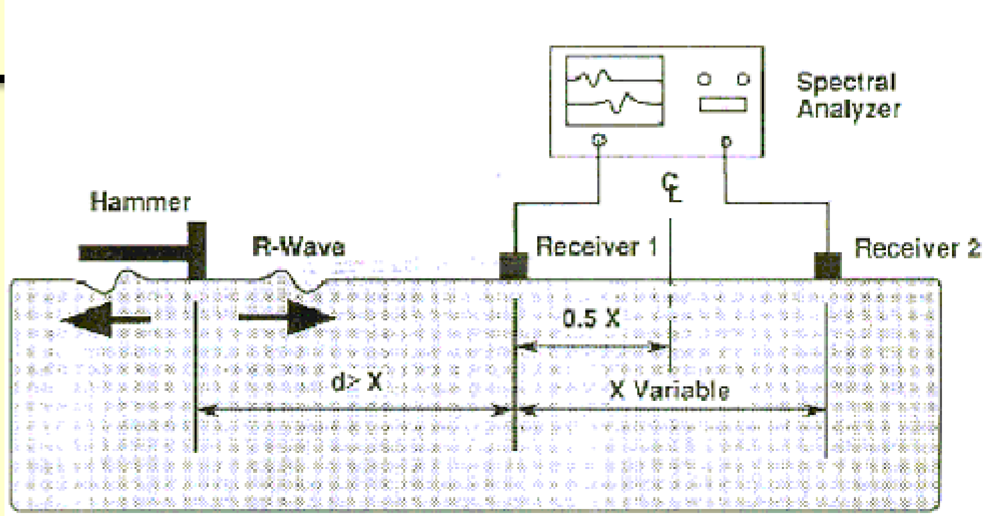
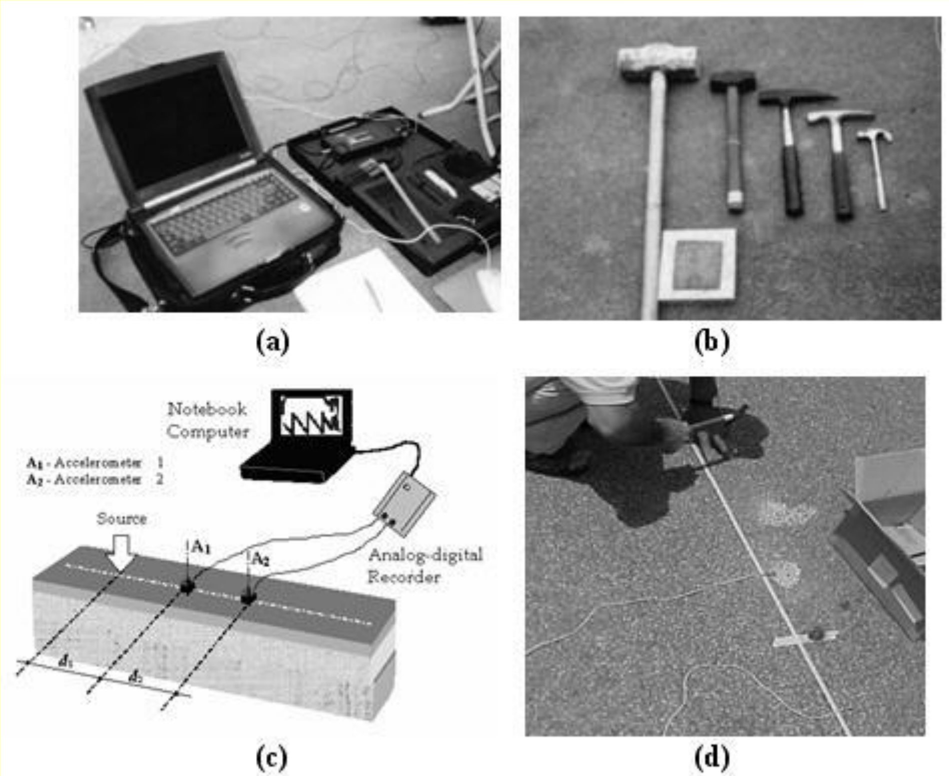
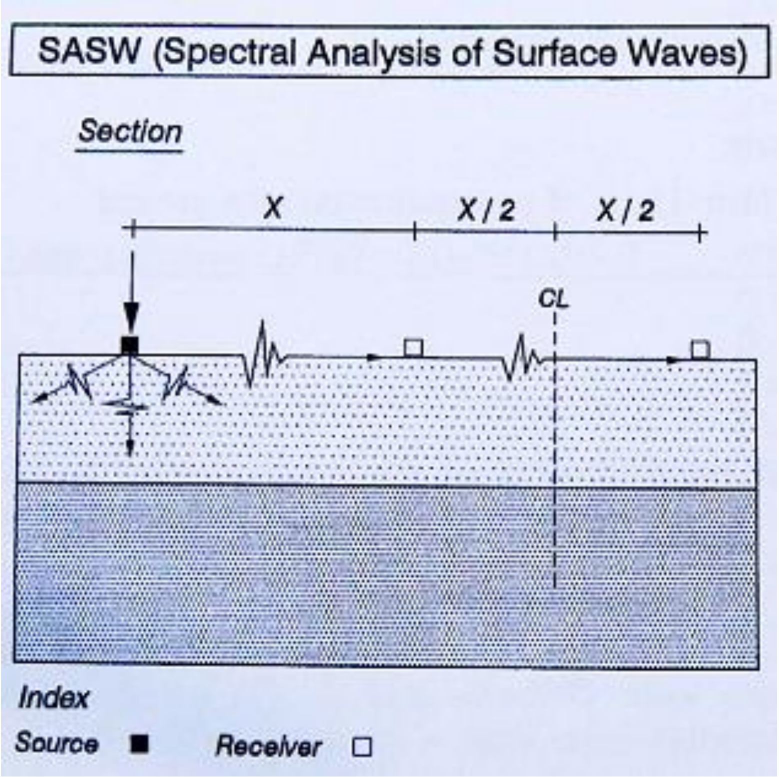




(a) (b)
(c) (d)



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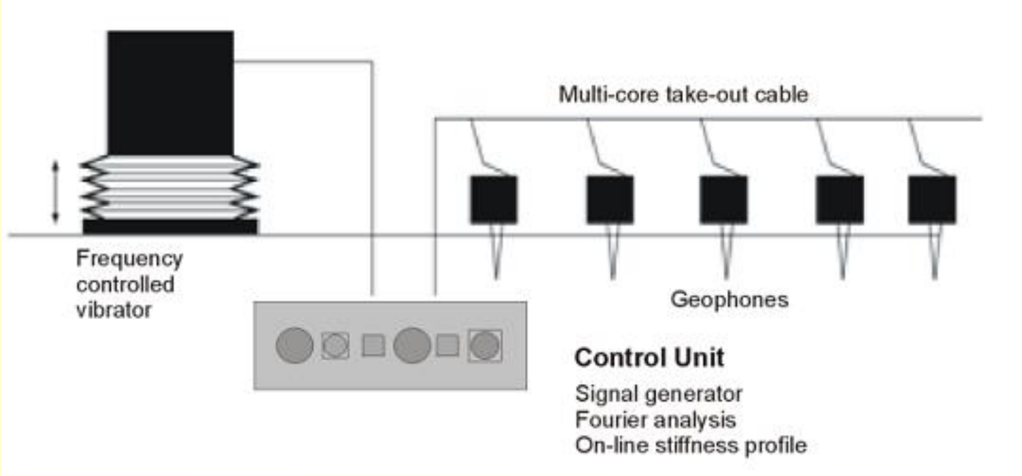
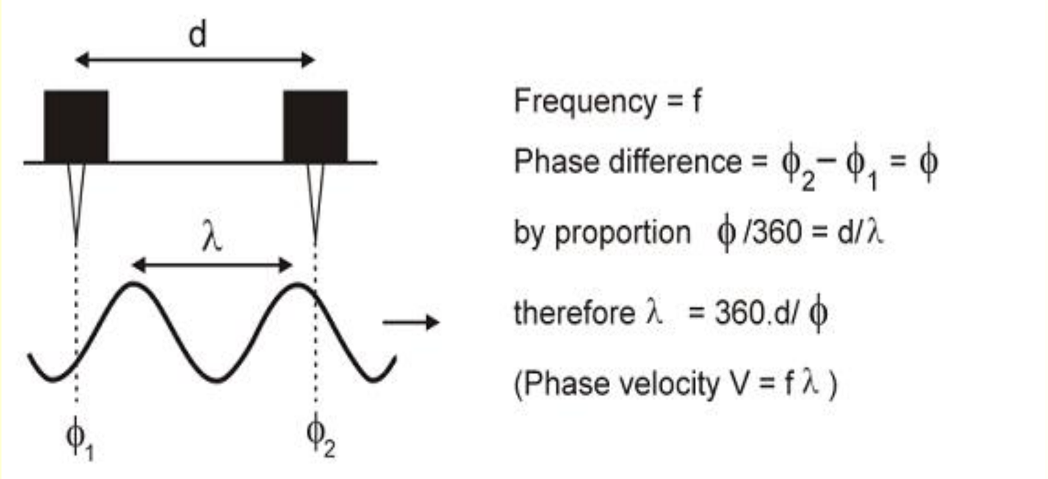
پارامترهای دینامیکی

Continuous Surface Wave System (CSWS)

پارامترهای دینامیکی

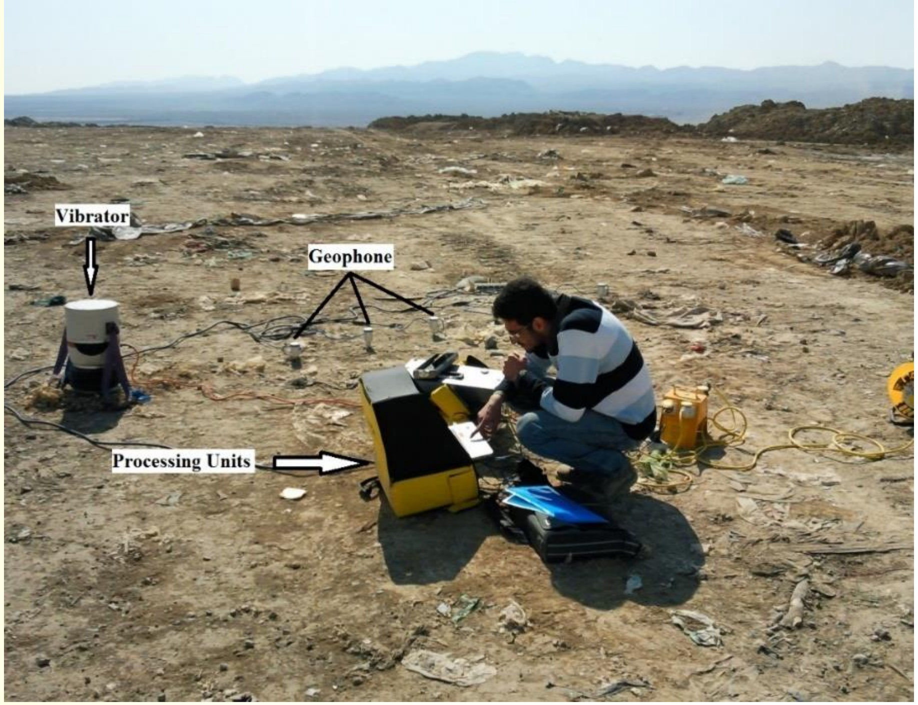




پارامترهای دینامیکی

Fig 4. Principal Components of CSWS

پارامترهای دینامیکی



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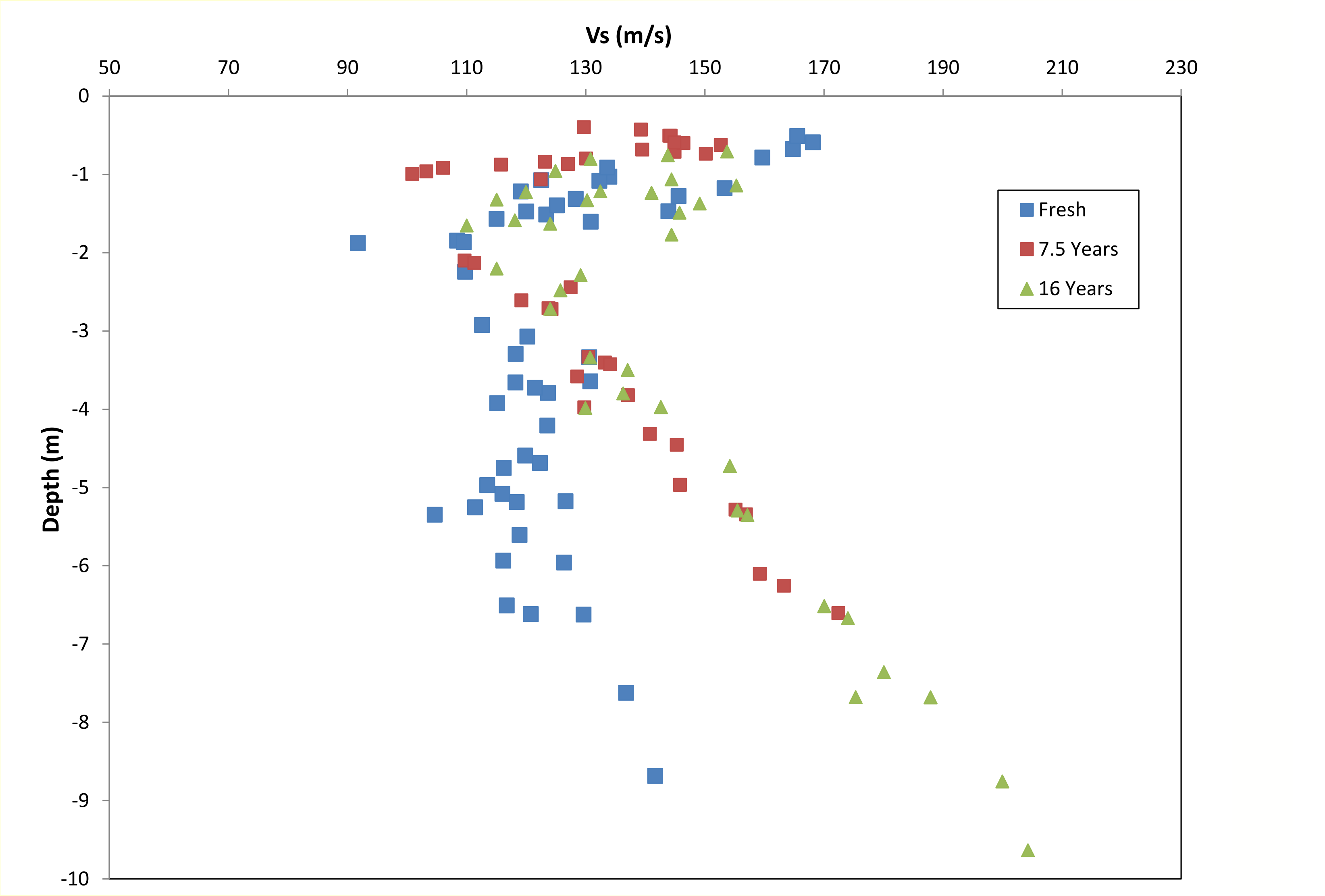

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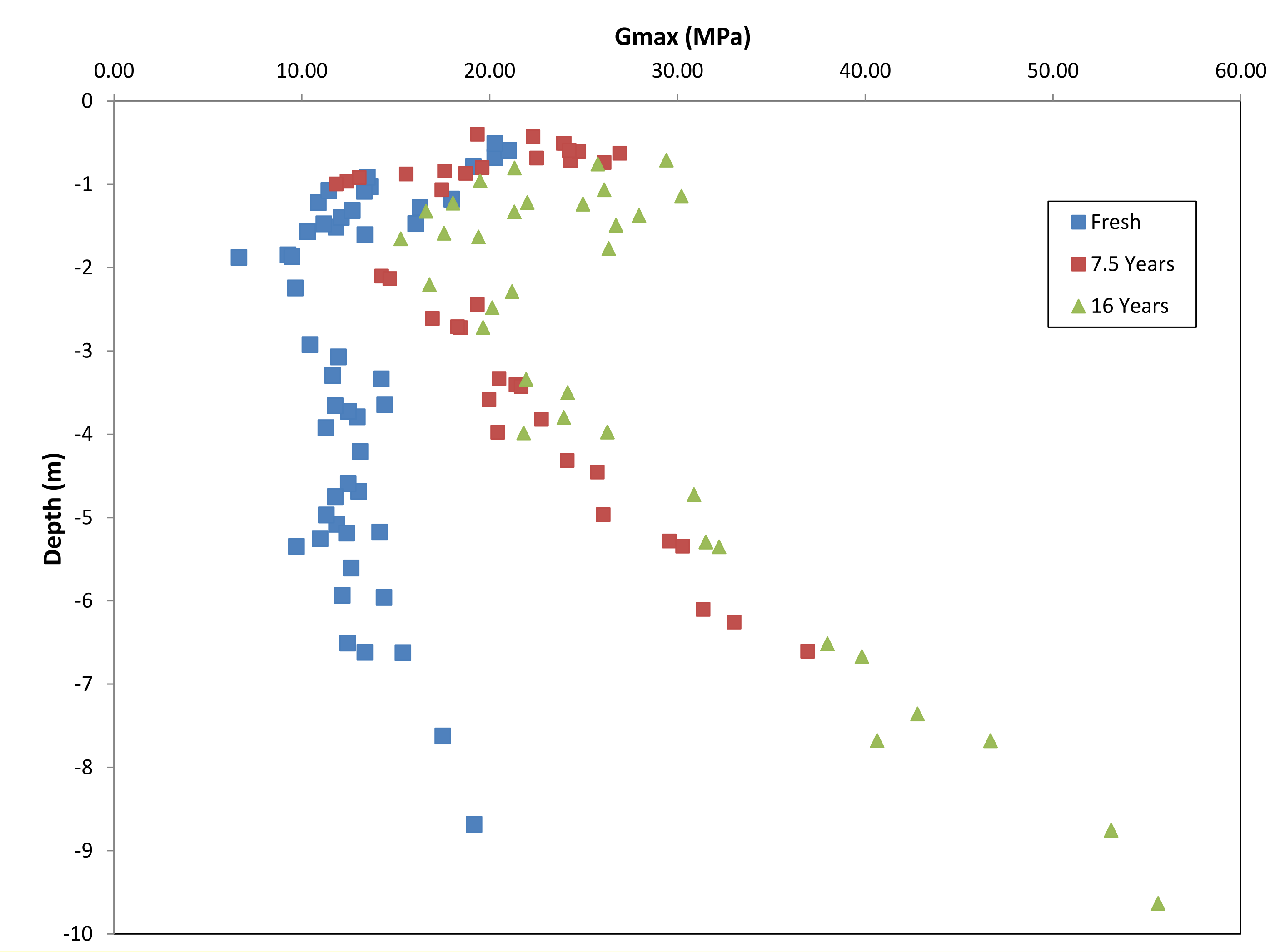

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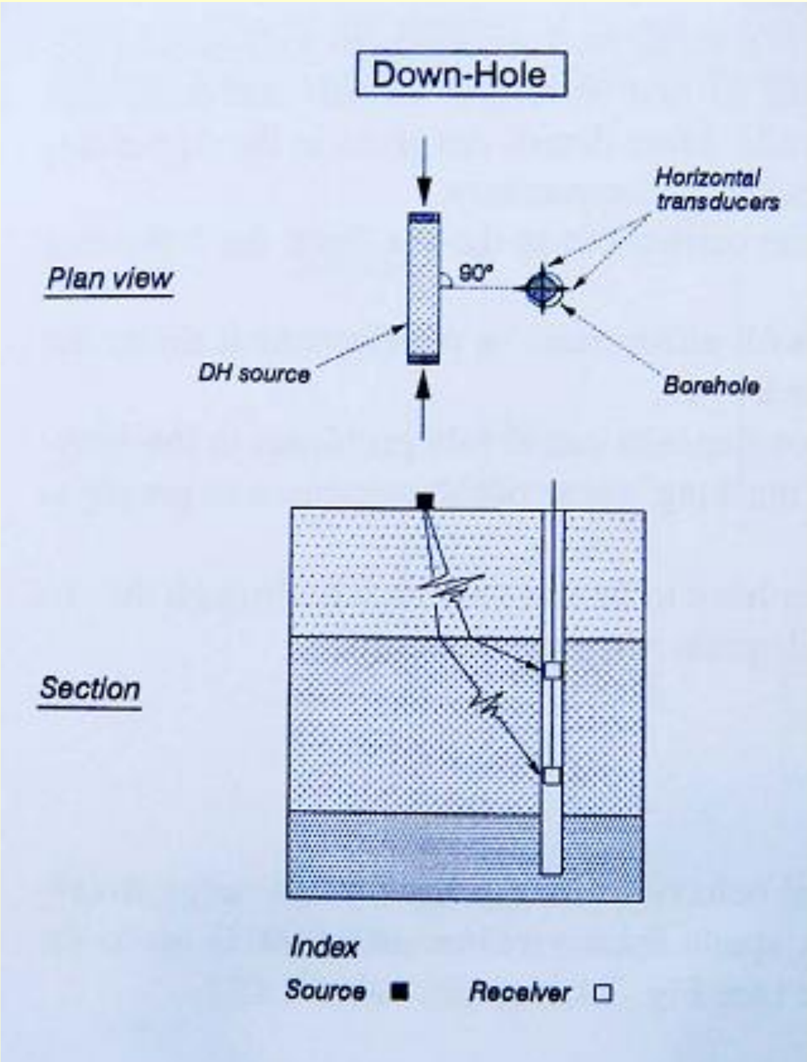

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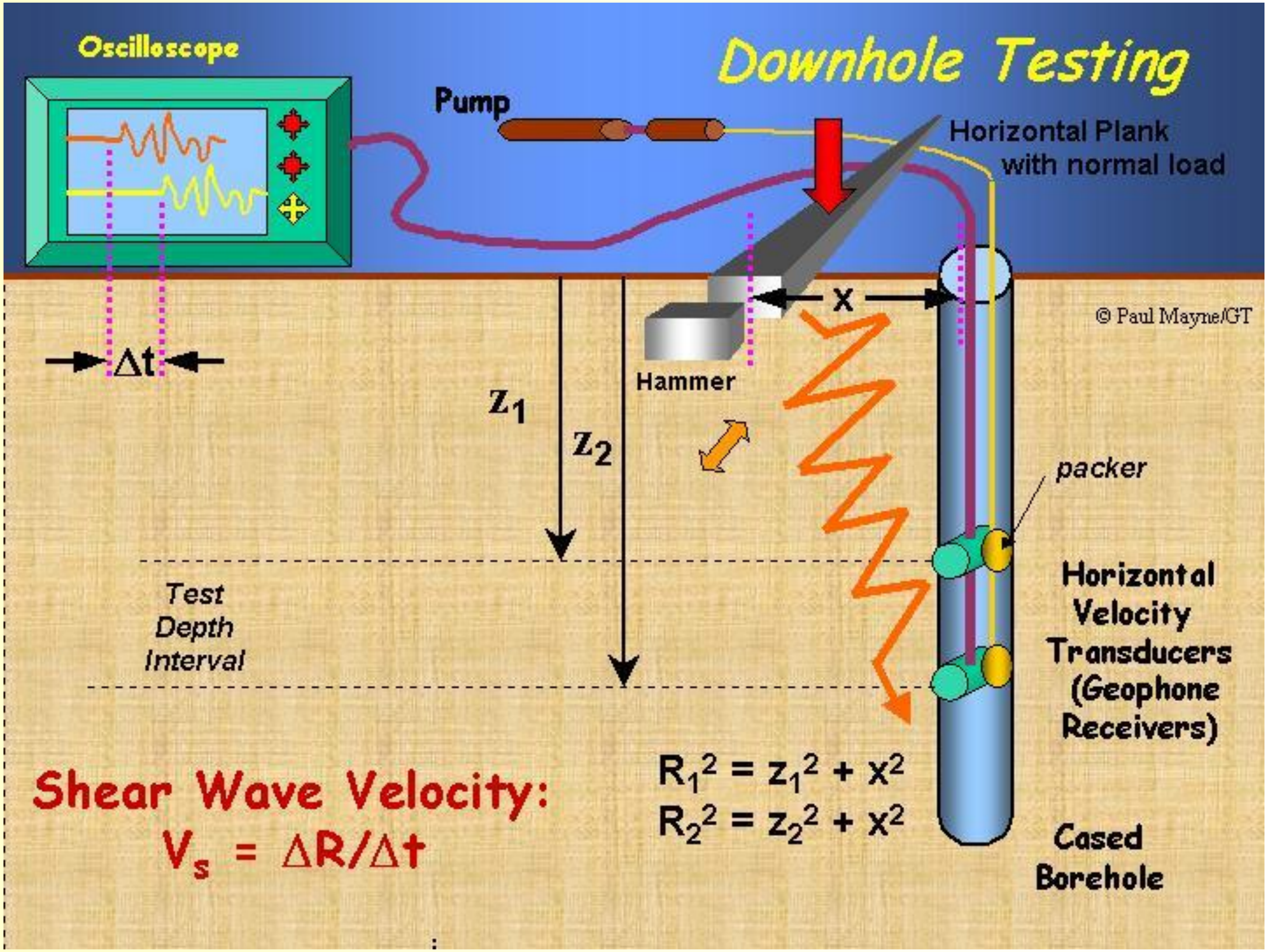

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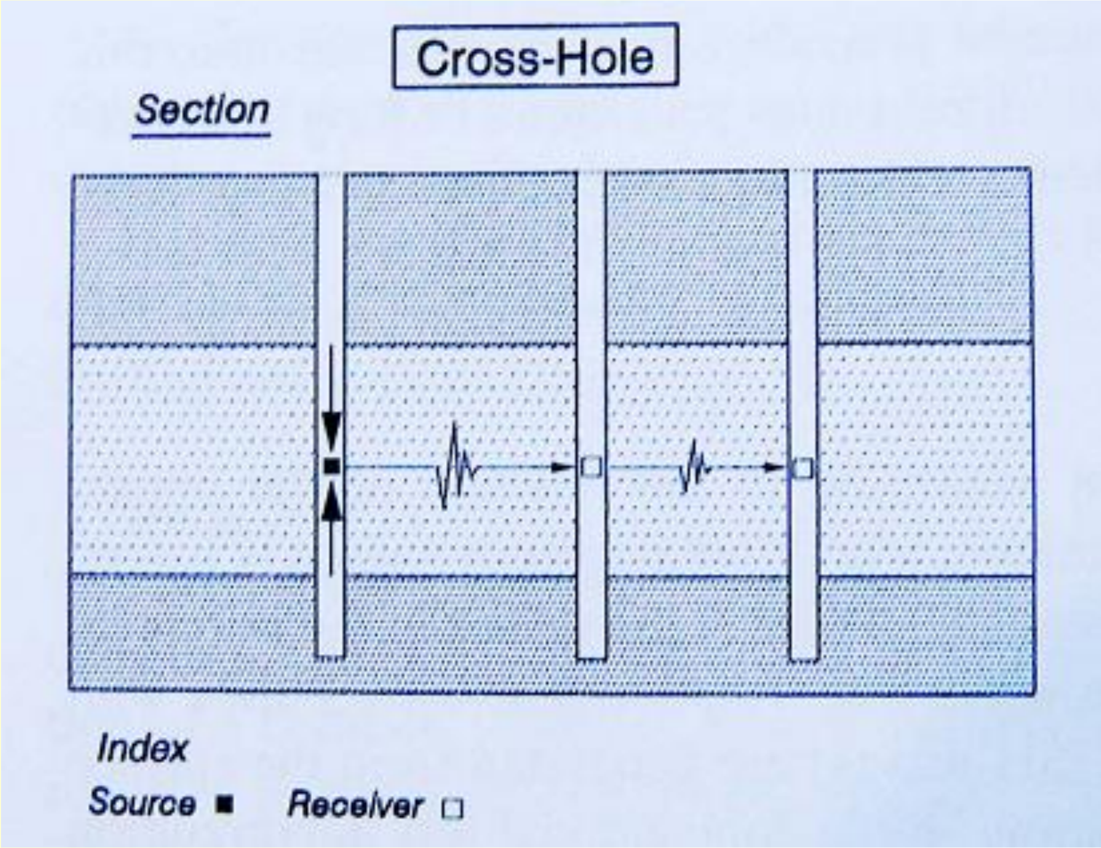

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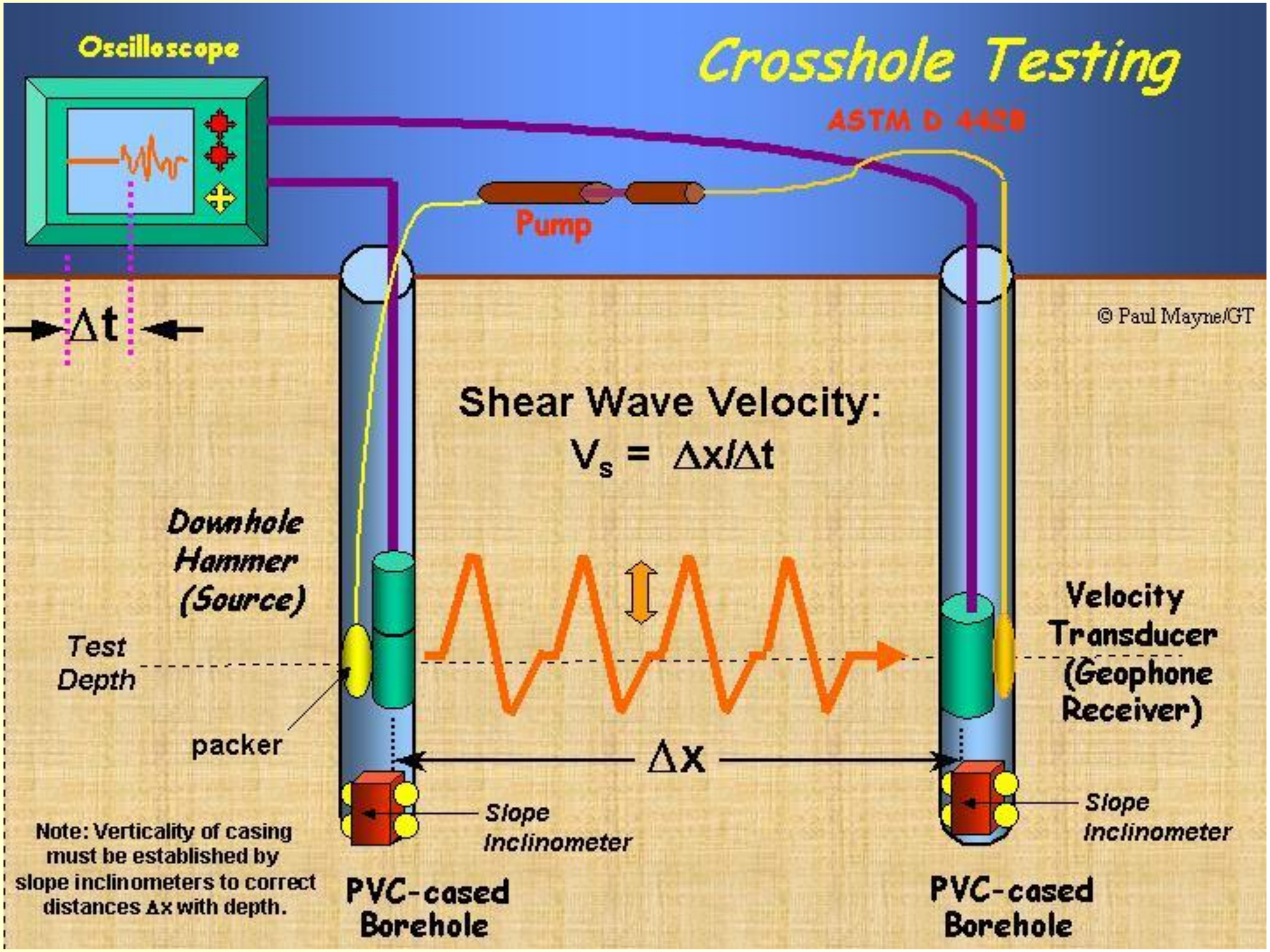

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