INGENIERÍA CIVIL

Programa de Doctorado en Ingeniería

Línea de Investigación

Geotecnia y Riesgos Geoambientales

50 AÑOS POSGRADOS INGENIERÍA CIVIL

Área Curricular de Ingeniería Civil y Agrícola
Facultad de Ingeniería
Sede Bogotá

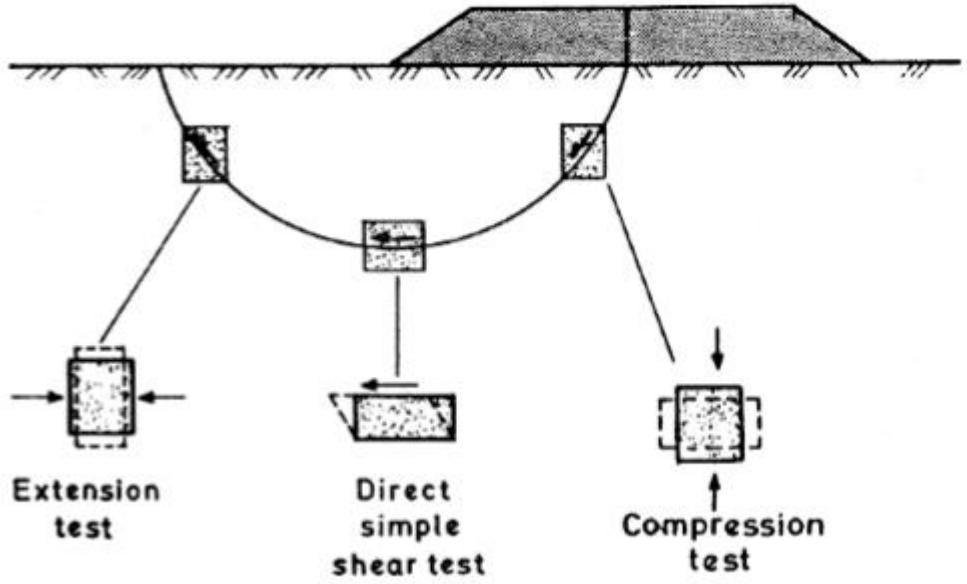
UNIVERSIDAD NACIONAL DE COLOMBIA

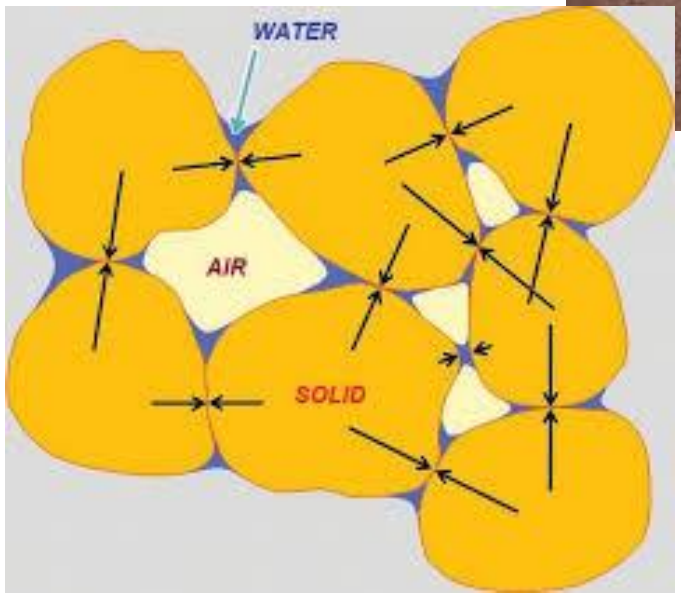
An investigation of the relevance of dynamical systems based soil mechanics on the anisotropic stress-strain-strength characteristics of clays

Ing. German Corredor – PhD Student

Anisotropy

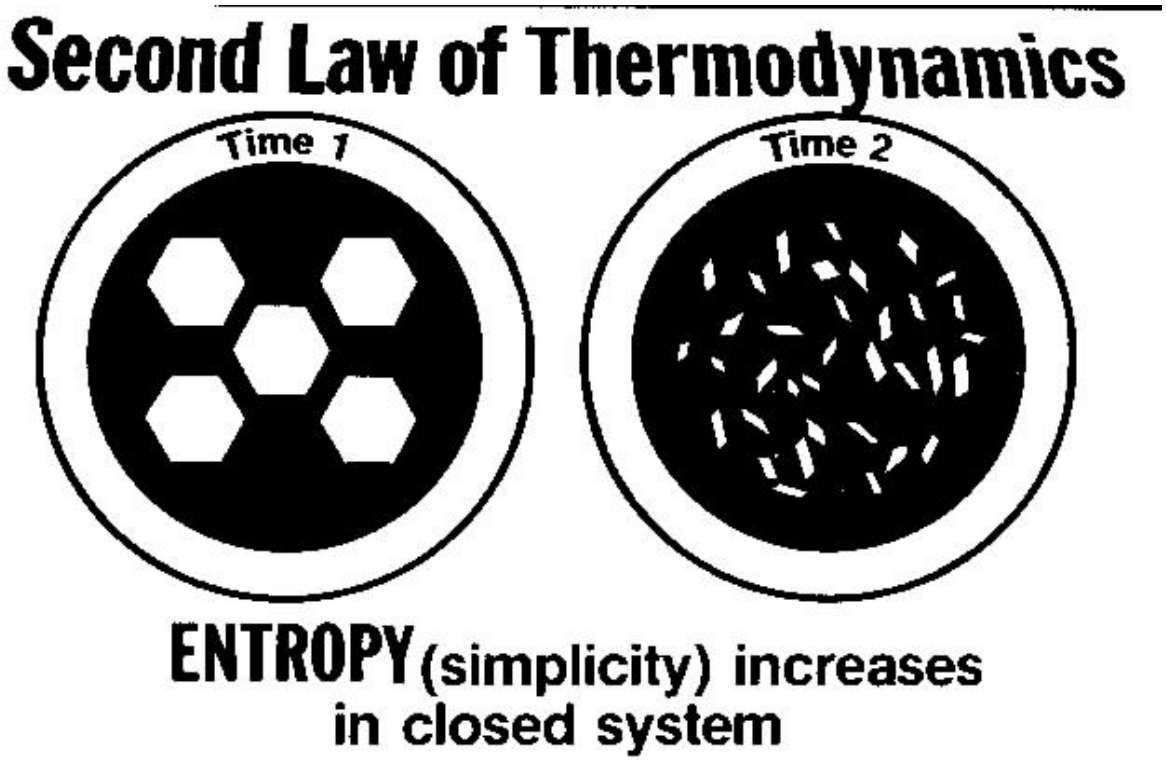
- The anisotropy is referred as any directional dependence of the properties of a material.





Thermodynamics.

- Motions and properties of the individual particles are averaged. (Statistical Mechanics)
- Generally in geotechnical processes, temperature or heat do not have greater influence, but the conservation principles of thermodynamics must be respected. And several models do not fully comply with these principles



Thermodynamics.

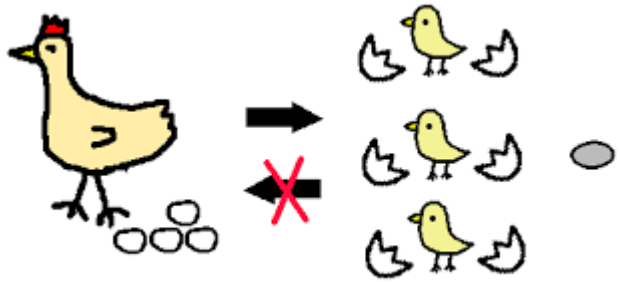
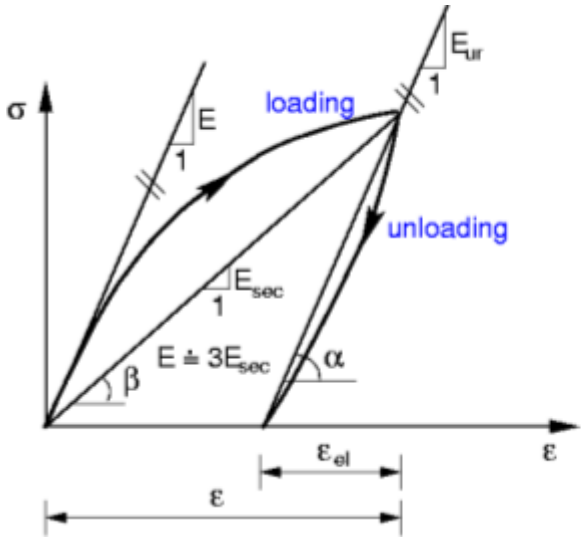
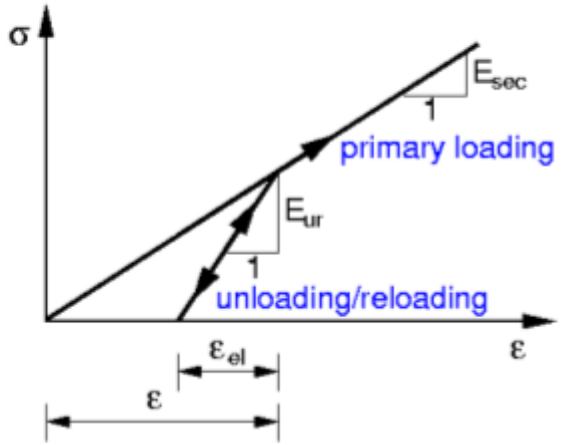


Figure 3

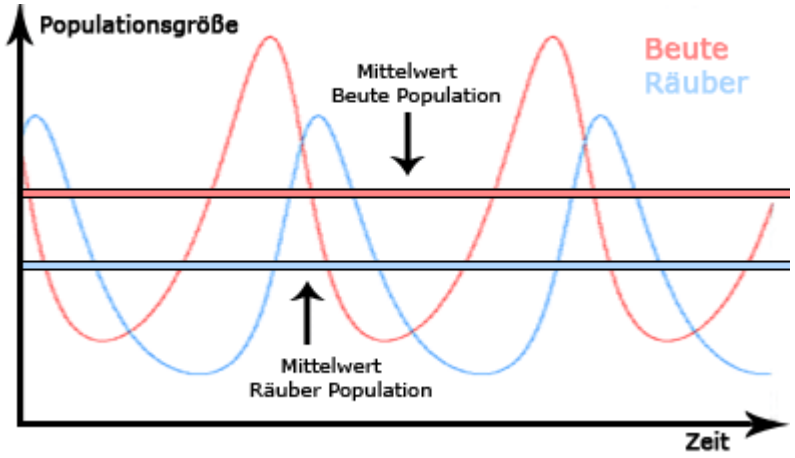
- Irreversible process <-> irrecoverable deformations.

- When does it start ?



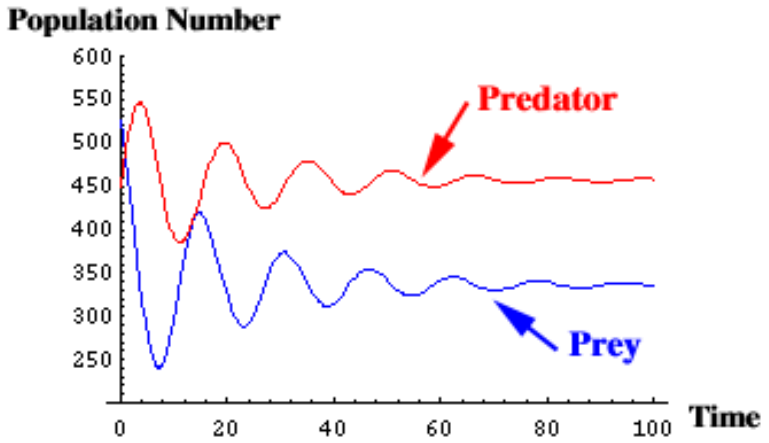


Dynamical Systems



$$\frac{dq}{d\epsilon} = p' A\, e^{-B\epsilon} - q\, J\, e^{-D\epsilon}$$

$$\frac{dp'}{d\epsilon} = p' L\, e^{-B\epsilon} - q\, K\, e^{-D\epsilon}$$



Unsaturated Soils

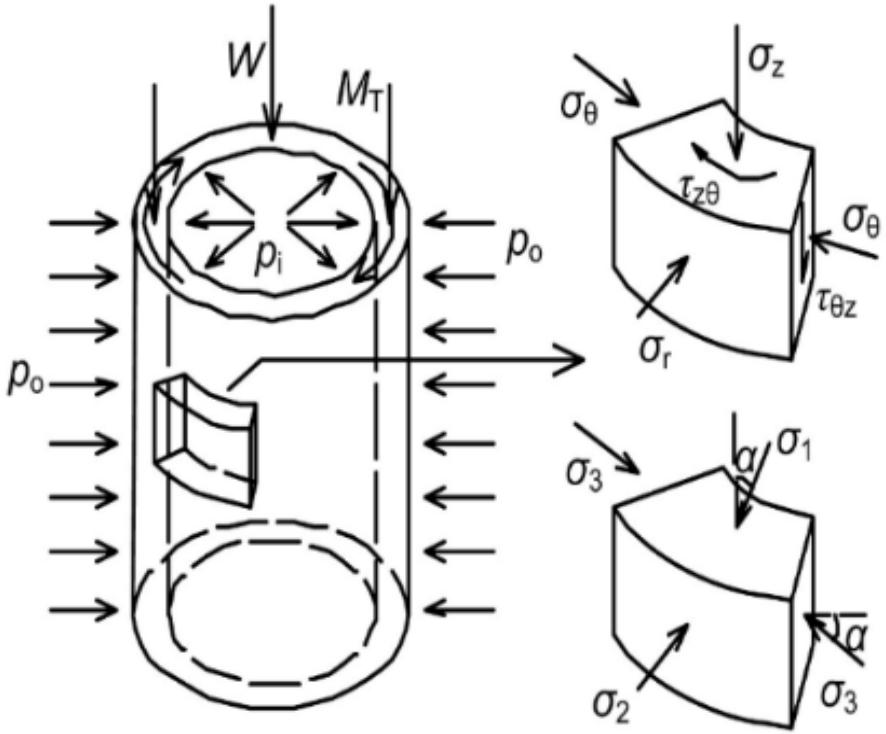
$$\sigma'_{ij} = (\sigma_{ij} - P^a \delta_{ij}) + \chi \; P_c \delta_{ij}$$

1. Much debate on the application of effective stress concepts.
2. Choice of effective stress parameter

The interplay of all phases and interfaces governs the overall mechanical behavior.

Pertinence of laboratory devices in the study of soil characteristics, involving anisotropy

- **HCA**



Advantages:

- **Uniformity in the stress and strain distributions within the specimen**
- **Possibility to manage both the direction and magnitudes of the principal stresses during shear**
- **Provide information on the directional variation of soil stiffness (anisotropy)**

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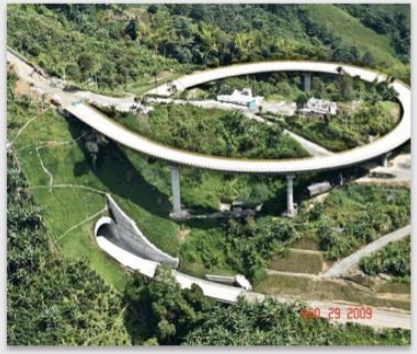

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