

What soil tests are required?

1. What parameters you need for analysis and design? – depends on ULS or SLS or nat freq
2. ULS design: [predominantly: Soil strength parameters]
3. SLS & nat freq calculations: Soil Stiffness
4. Long term performance: Cyclic behaviour of soils
5. Drained or undrained: Soil permeability

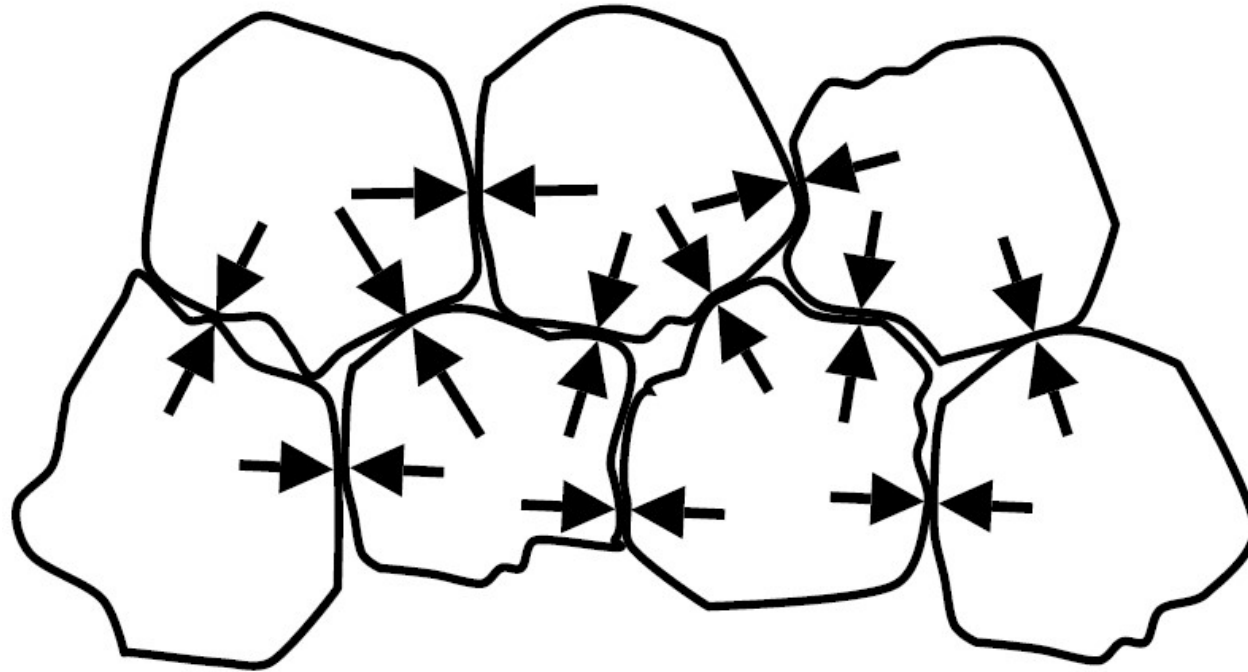
Fundamental soil behaviour

- Soil behaviour are large strains
 - ULS loads

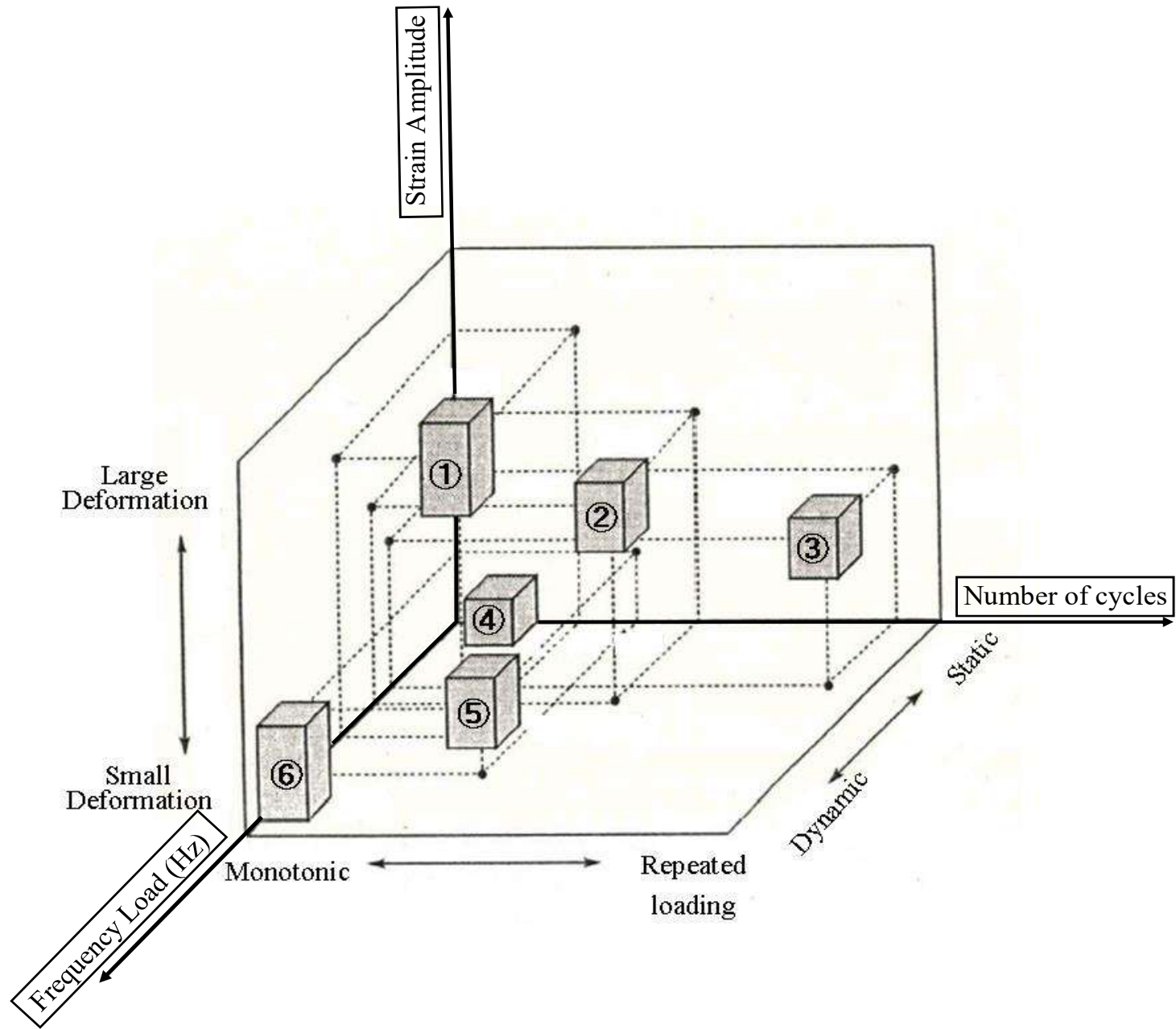
- Soil behaviour under large number of cycles
 - FLS loads

Resonant column test: coarse-grained soils

- ❑ Clean sands are frictional materials;
- ❑ Clean sands are also known as cohesionless soils;
- ❑ Strength and stiffness arise from inter-particle forces exerted between the grains

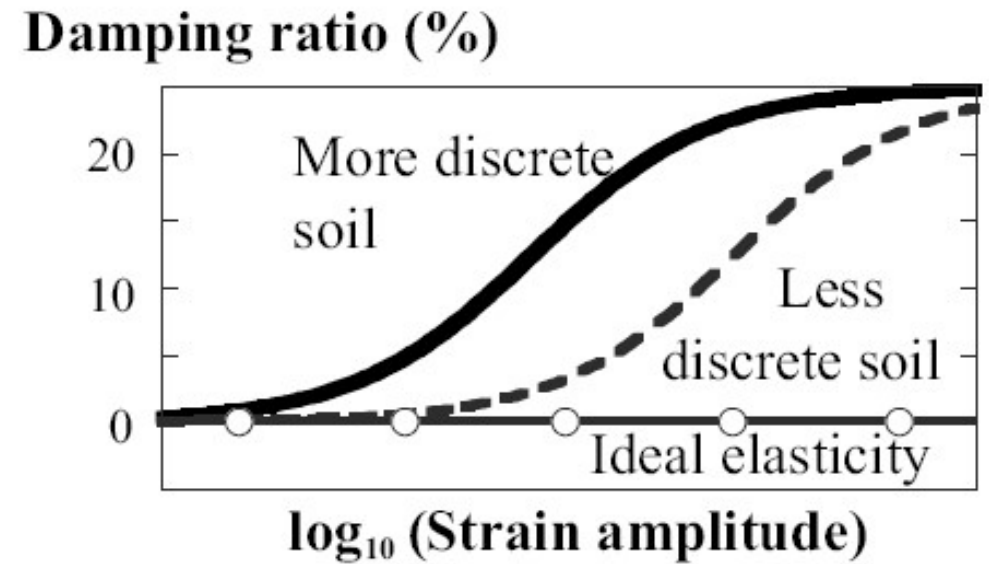
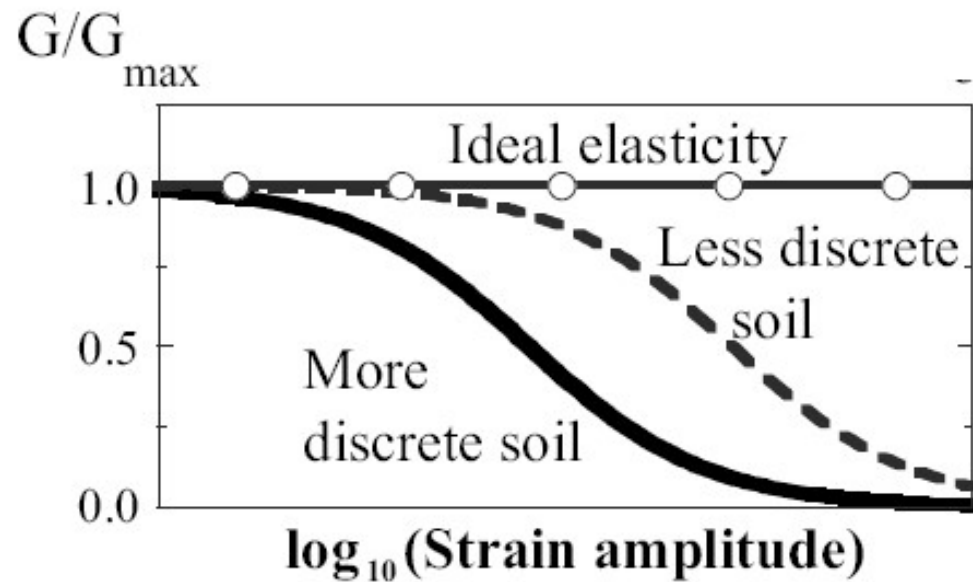


Schematic representation of forces acting at contacts between grains



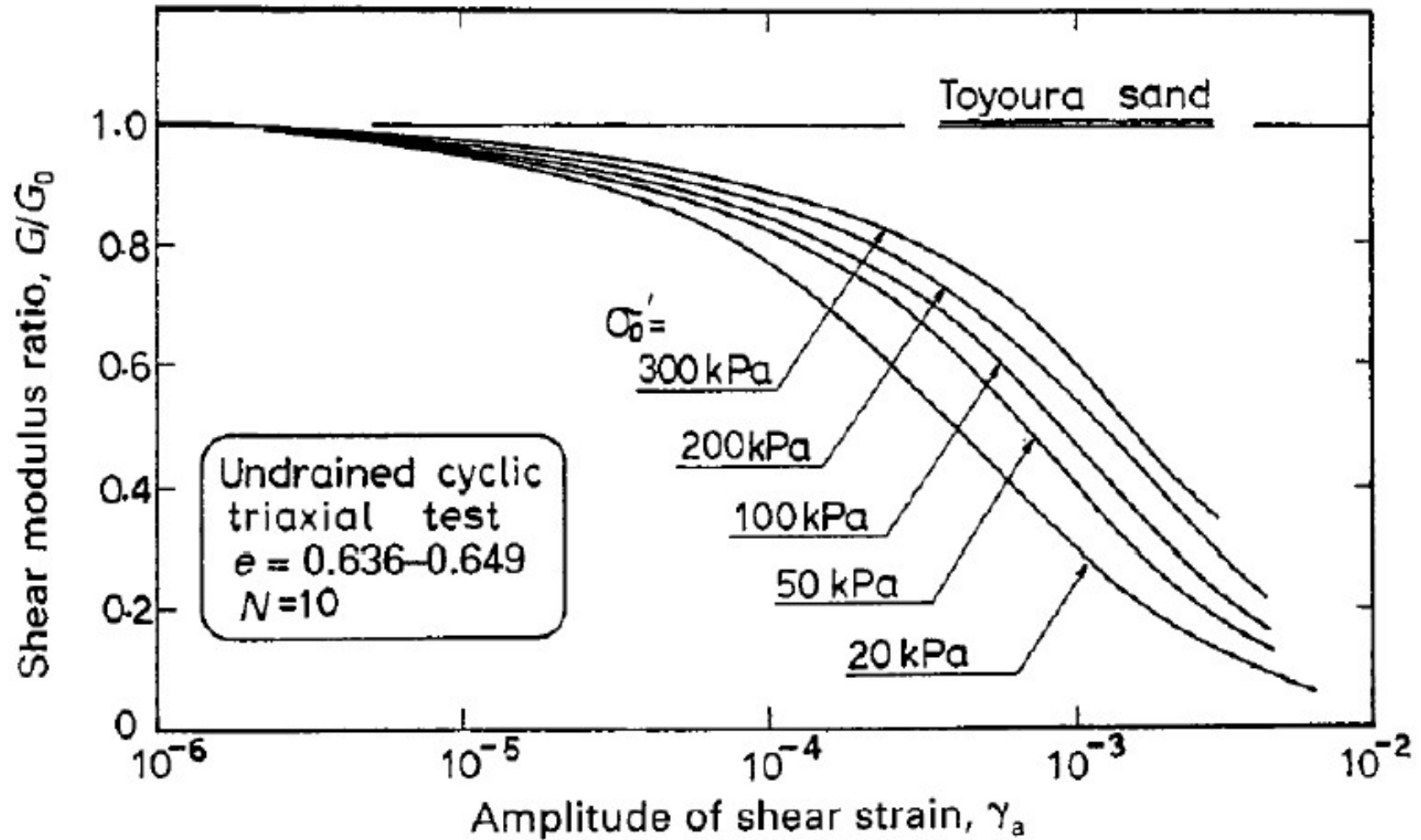
Resonant column test: non-linear material idealisation

Linear-elastic material: Constant stiffness and zero damping



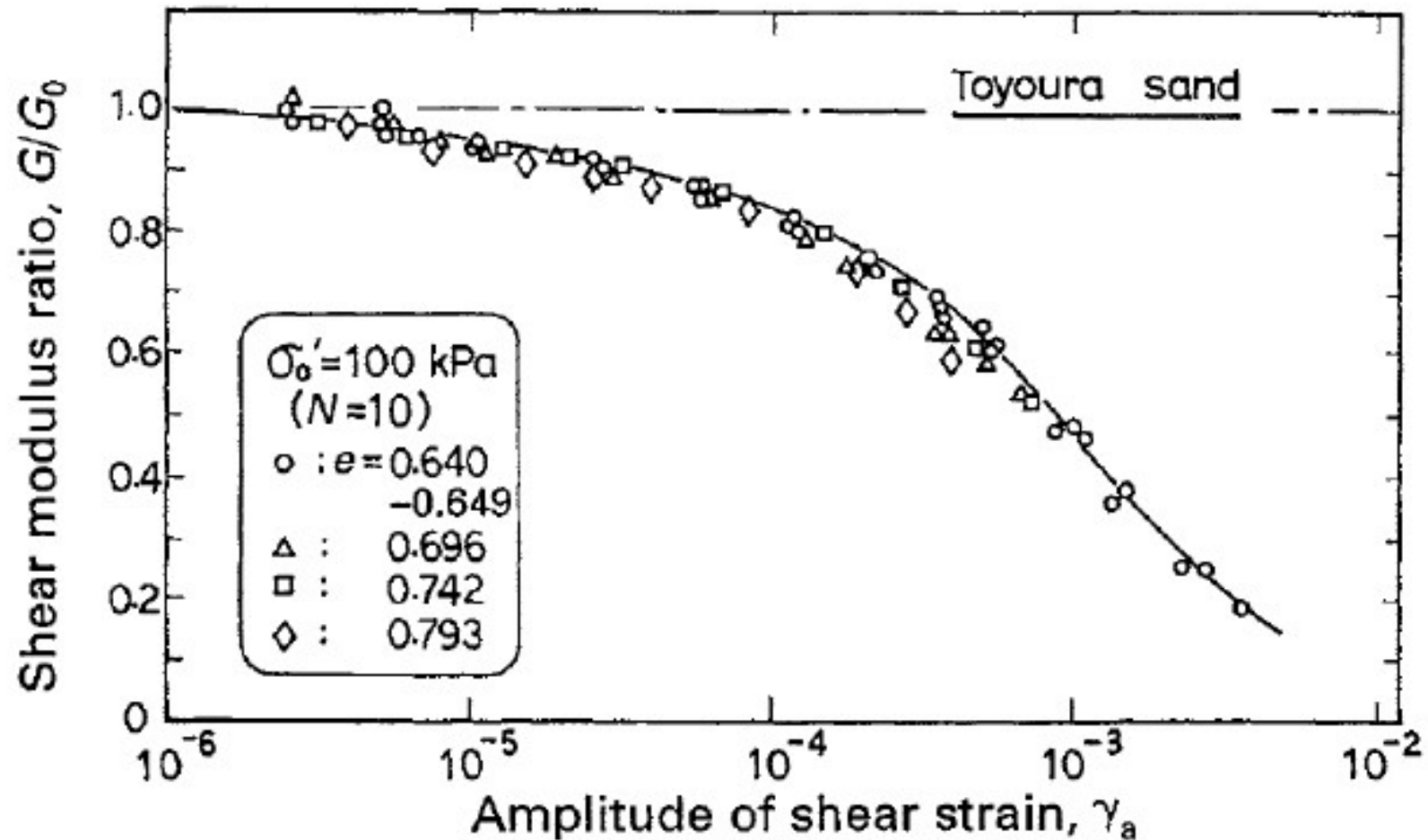
Resonant column test: coarse-grained soils

Effects of confining stresses on secant reduction curve



Resonant column test: coarse-grained soils

Effects of density (degree of packing) on secant reduction curve



Resonant column test: coarse-grained soils

Effects of effective stress on damping

