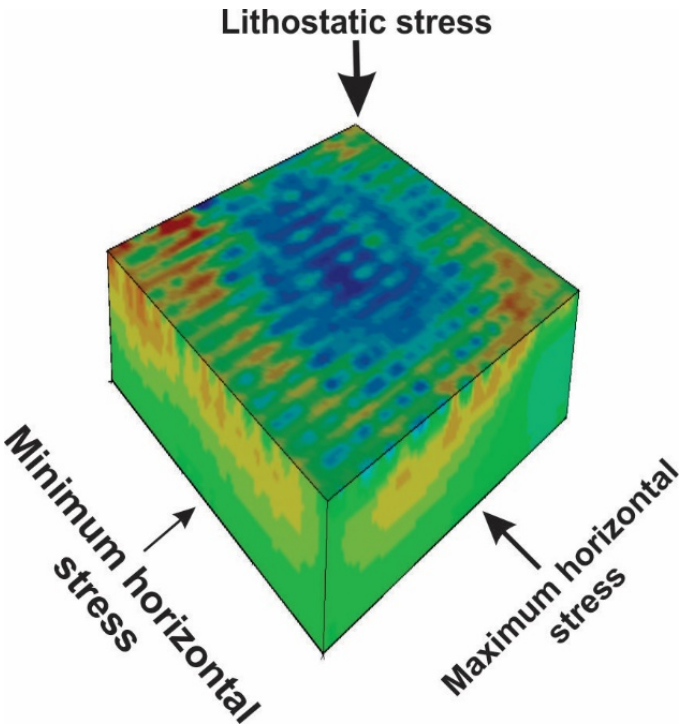
UWI
ST. AUGUSTINE CAMPUS

FACULTY OF
ENGINEERING

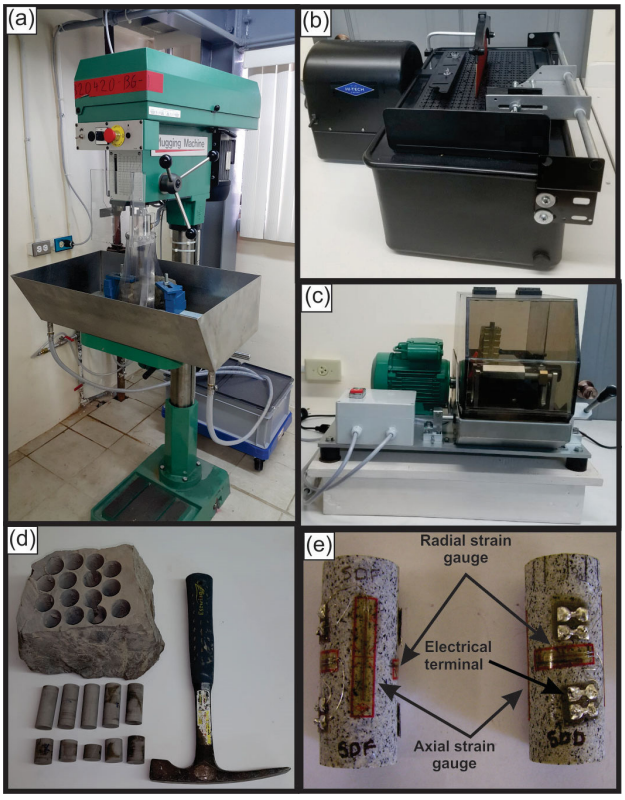
DEPARTMENT OF CHEMICAL ENGINEERING
PETROLEUM GEOSCIENCE
GEOMECHANICS AND ROCK PHYSICS LABORATORY

To provide professional geomechanical and rock physics research and services both locally and regionally, utilizing state of the art innovation and cutting-edge technology.



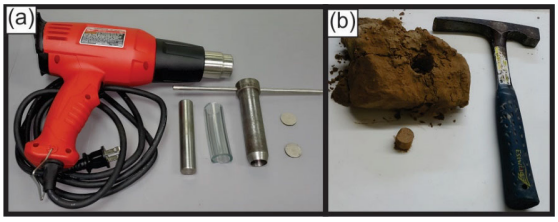
Rock Preparation Workshop

1. Plug samples from well core and outcrop consolidated samples.



Preparation of consolidated samples.
a) Plugging machine. b) Diamond blade saw. c) Precision end-face grinder. d) Plugs from cretaceous shale. e) Radial and axial strain gauge glued to plugs.

2. Plug samples from well core and outcrop unconsolidated samples.

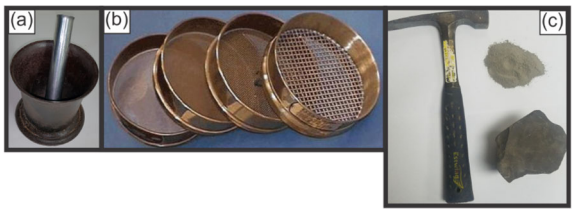


Preparation of unconsolidated samples.
a) Plunger and accessories. b) Plug from Pliocene sandstone.

3. Plug samples from outcrop.

a) Plugging outcrop using portable core drill equipment. b) Sandstone plug from outcrop.

4. Crush and sieve samples to required size.



Crushing samples. a) Motar and pestle. b) Rock sieves of various sizes. c) Crushed shale sample < 53 µm.

5. Clean sample pores using Soxhlet extractor.

Cleaning oil from shale plugs using Soxhlet extractor.

Contact (For Further Information):

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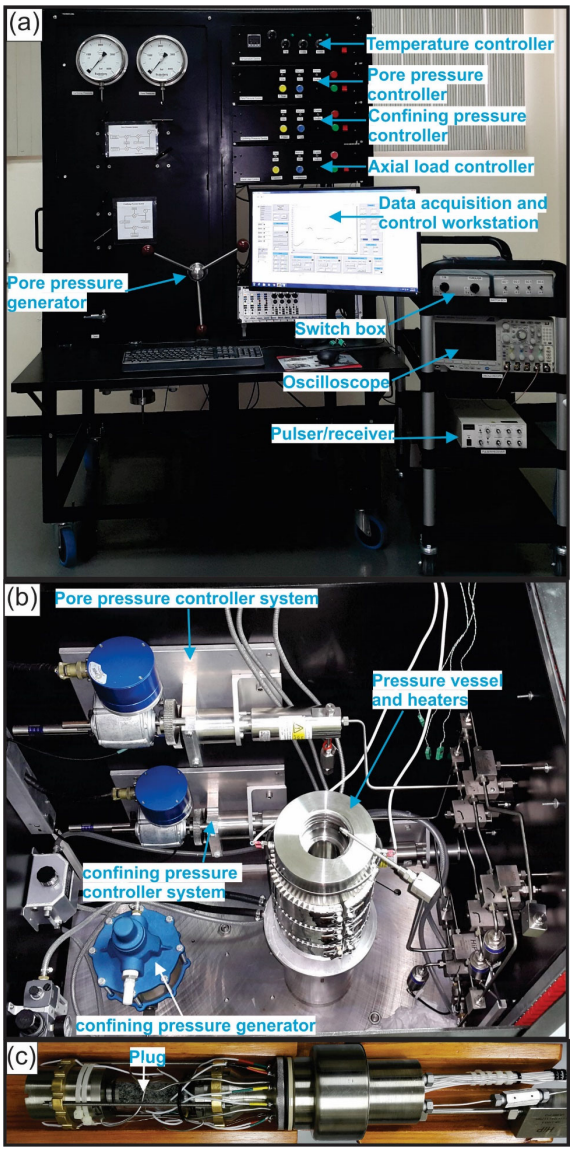
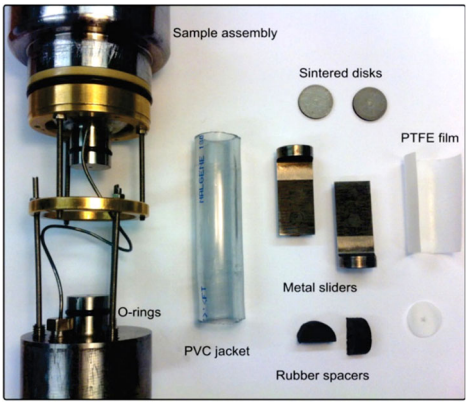
Geomechanics and Rock Physics

Triaxial Apparatus



Main components of the Triaxial apparatus. a) Front view showing controllers and ultrasonic system: switchbox, oscilloscope and pulser/receiver. b) Inside view showing confining and pore pressure controller systems and Vessel with heaters. c) Seismic sample assembly that is key to carrying out velocity, elasticity, strength and permeability measurements.



Standard sample assembly with direct shear sliders and accessories. This assembly is used to measure friction coefficient and permeability.

<u>Specifications of triaxial apparatus</u>:

- Servo-controlled pore and confining pressures up to 200MPa (29000 Psi) (equivalent to 8km depth if effective pressure is 200MPa).
- Servo-controlled differential load capacity up to 955 MPa (138500 Psi, 300 kN).
- Cylindrical plug of size: 20mm diameter by 50mm length.
- Strain rates from 10^{-8} s^{-1} to 10^{-5} s^{-1}.
- Temperature up to 200°C.
- Permeability measurement from 10^{-16} to 10^{-23} m^2.
- P-wave, S-wave, and S-wave splitting data measurements.
- 4 independent strain gauges on sample to measure deformation.

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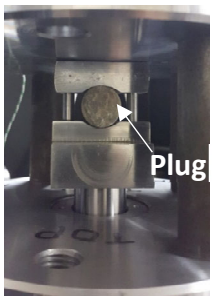
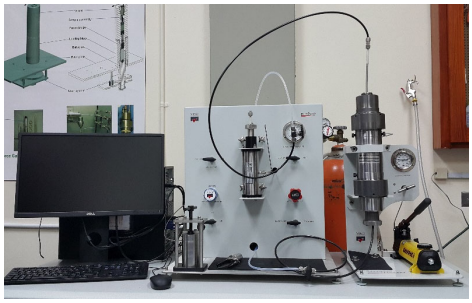
Types of Tests

1. Uniaxial compressive strength test
2. Triaxial compressive strength test
3. Hydrostatic compression test
4. Uniaxial tensile strength test (Brazilian test)
5. Friction coefficient test
6. Uniaxial static elasticity (Young's modulus and Poisson's ratio) test
7. Triaxial static elasticity (Young's modulus and Poisson's ratio) test
8. Static bulk modulus measurement
9. P-wave and S-wave velocities and attenuations measurements
10. S-wave splitting measurement
11. Permeability measurement
12. Porosity measurement
13. Density measurement
14. Resistivity measurement

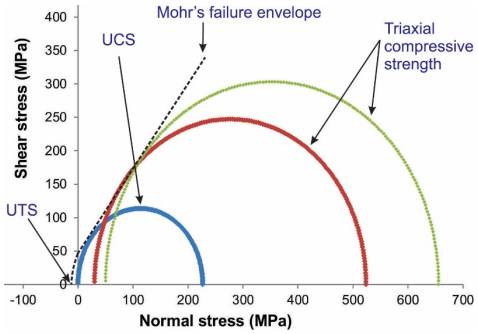


Brazilian testing assembly.

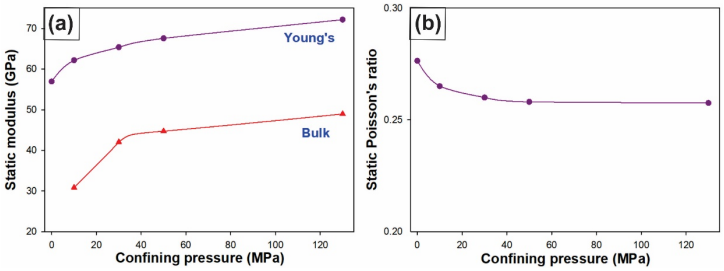


Porosity and reservoir permeability (10^{-12} to 10^{-18} m^2) apparatus.

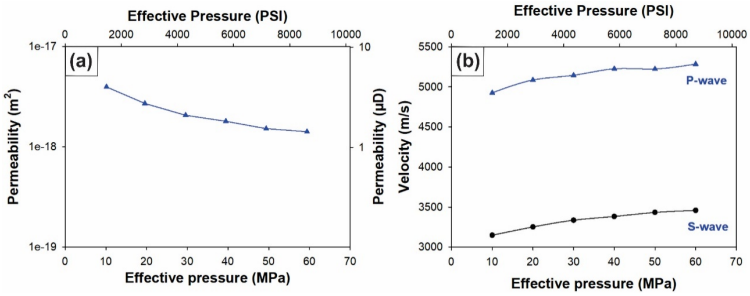
Sample of Results



Uniaxial tensile (UTS), uniaxial compressive (UCS) and triaxial compressive strength of a crystalline rock.

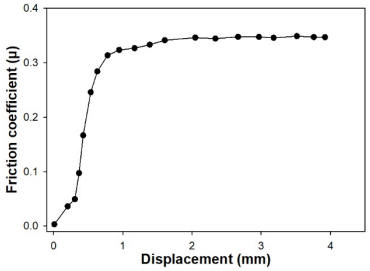


Static bulk and Young's moduli (a) and Poisson's ratio (b) as a function of hydrostatic confining pressure for a crystalline rocks.



Permeability (a) and P- and S-wave velocity (b) as a function of effective pressure for a tight sandstone.

Friction coefficient of talc.



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