Objective

To determine the relationship between shear load and shear strain.

Apparatus

Rubber shear apparatus, Hanger, Weights, Dial Gauge,

Theory

The force which tends to cut off or parts off one portion of the component from the other is called shear force.

Stresses produced on the area under shear, due to shearing forces, are called shearing Stresses. Shear stress is denoted by τ.

Mathematically,

Shearing stress = Shearing force/ Area under shear

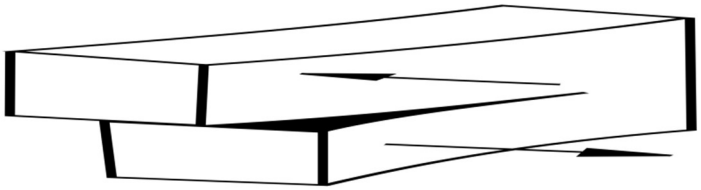

Figure 13 Shear Stress

Shearing strain is the angle of distortion. It can be represented by γ.

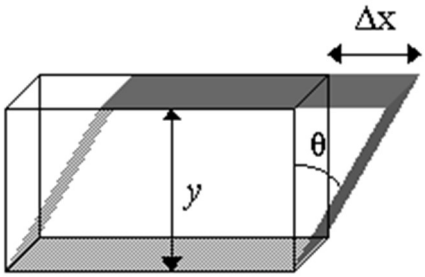

Figure 14 Shear Strain

$\theta = \text{Tan}^{-1}(\Delta x \backslash y)$

The constant of proportionality relating shear stress and shear strain is modulus of rigidity. It is represented by **G**.

Mathematically,

G = Shear stress/ shear strain

Units of G: Newton per square meter (N/m2) = Pascal (Pa) or pounds per square inch (psi)

Apparatus assembly

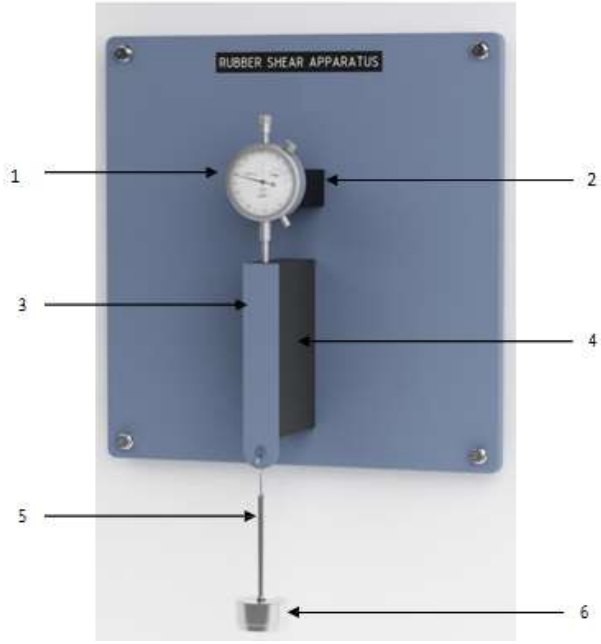

Figure 15 Apparatus Assembly

1. Dial Gauge	2. Dial Gauge Holder
3. Flat Steel Bar	4. Shear Element(Rubber)
5. Weight Holder	6. Weights

Procedure:

- First ,measure the length width and height of rubber
- Set dial gauge to zero
- Apply the weight of 10N and increase to 100 N
- Using all thee these readings calculate the shear strain, shear stress, shear modulus.

Observations

Height=h=

Width=w=

Length=l=

Area= H*w

Sr.No	Force (N)	Shear Deformation-δs			$\gamma=^{\delta}s\backslash l$	$\tau=F\backslash A$	$G=\tau\backslash\gamma$
		Loading	Unloading	Mean			
1	10						
2	20						
3	30						
4	40						

Procedure (Students' own words)

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Difficulties / Suggestions

Concluding Remarks / Comments

Questions

1. **Various methods to determine shear modulus of rubber?**

2. **How to eradicate errors?**

3. **How to improve experimental procedure?**