

Lab 04 To find out the shear modulus of rods under torsional loading.

Name:

ID:

Apparatus: Torsion of bar apparatus, vernier caliper, weights

Length of shaft (L)=cm	37.4 cm	374 mm	0.374 m
Diameter of shaft (d)=mm	3.9 mm	0.0039 m	
Diameter of Torque pulley (D)=mm	125.2 mm	0.1252 m	
Radius of Torque Pulley (R=D/2)=	118.8 mm	0.1188 m	
Polar moment of insertion of the shaft=J	=	2.27122E-11	
Theta_1	θ_1 =	6 cm	60 mm
Theta_2	θ_2 =	25 cm	250 mm
	$J = \frac{\pi d^4}{32}$	=	2.27122E-11

Serial No	Mass g	Load (W) N	Torque WR Nm	Angle of Twist at 1st measuring arm			Angle of Twist at 2nd measuring arm		
				Loading (degree)	Unloading (degree)	Mean	Loading (degree)	Unloading (degree)	Mean
1	0	0	0	0	0	0	0	1	0.5
2	500	4.9	0.58212	4	2	3	4	3	3.5
3	800	7.84	0.931392	6	3	4.5	7	5	6
4	1000	9.8	1.16424	9	5	7	9	5	7

$$G = \frac{\tau L}{J\theta}, unit Pa$$

Angle of Twist at 1st measuring arm			Angle of Twist at 2nd measuring arm			Angle of twist for effective length theta	Modulus of rigidity
Loading (radian)	Unloading (radian)	Mean, theta_1	Loading (radian)	Unloading (radian)	Mean, theta_2		
0	0	0	0	0.017453293	0.008726646	0.008726646	0
0.06981317	0.034906585	0.052359878	0.06981317	0.052359878	0.061086524	0.008726646	8.37E+07
0.104719755	0.052359878	0.078539816	0.122173048	0.087266463	0.104719755	0.026179939	4.02E+08
0.157079633	0.087266463	0.122173048	0.157079633	0.087266463	0.122173048	0	0.00E+00