Torsional surface moving a distance ? x.since the number

Torsional Stiffness (GK)GK= TL/? (N*m2/rad)where? is the angle of twist in radiansT is the applied torque in N*mL is the beam length in mFor a beam of uniform cross-section along its length:?= TL/KGwhere? is the angle of twist in radiansT is the applied torqueL is the beam lengthK is the torsional constantG is the Modulus of rigidity (shear modulus) of the materialshear modulus or modulus of rigidity, denoted by G, or sometimes S or ?, is defined as the ratio of shear stress to the shear strain: The relationship between the torsional spring constant and the diameter of the wire? = ? Gd^4/ 32lwhere d is the diameter of the wire and l is the length of the wire. G is the shear modulus. an element of thin walled cylinder of length L, radius r and thickness dr which we will consider as part of a solid rod or wire. The end area of the elemental cylinder isdA = 2? rdr . When a horizontal force dF is applied to the top of the cylinder itproduces a torque d ? = r dF which 2rotates the cylinder through an angle ? and produces a shear strain.

Note that asthe cylinder is strained the volumedoesn’t change. The planes of atoms justslide over one another with the atoms atthe top surface moving a distance ? x. Since the number of bonds betweenatoms is what is important and this number depends on the area we define the shear stress as horizontal force divided by the end area ofthe thin walled cylinder. Why does the pendulum cometo rest? Damped oscillation:-Nature provides a large no. situations where restoring force acts. However in many cases some kind of damping fore also exists.

The damping force may arise due to friction between moving parts , air resistance etc. The damping force is a function of speed of the moving system and is directed opposite to the velocity. Energy is lost due to negative ofwork done and the system comes tohalt in due course. The damping force is a complicated function of speed . In , most practical cases the damping force is proportional to speedF=-bv. Hence the equation of motion is: m dv/dt=? kx? bv. For small damping the equation is of the form: x= A0e?(bt /2m)sin(wt + *)With damping the amplitude decreases exponentially as: