

38.2: Rotational Version of Hooke's Law

There is a rotational counterpart of Hooke's law:

$$\tau = -\kappa\theta \quad (38.2.1)$$

where κ is the spring constant, in units of Nmrad^{-1} . This version of Hooke's law applies to something like a torsional pendulum, in which a mass suspended by a wire is allowed to twist back and forth.

Couples

A couple is two forces, equal in magnitude and opposite in direction, but which are separated by some distance (Figure 38.2.1). Since the two forces are equal and opposite, a couple results in zero net force on the body. However, it does result in a torque on the body. If the forces act along lines separated by a distance l , then the torque τ acting on the body due to the couple is given by

$$\tau = Fl \quad (38.2.2)$$

Figure 38.2.1: A couple. The torque here is $Fx_2 - Fx_1 = F(x_2 - x_1) = Fl$.

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