Work Done by a Torque

- The work done by a force is:

$$W = \int_{x_0}^{x} F_x(x')dx'$$

- Torque is the angular equivalent of force.

- Angular displacement is the angular equivalent of displacement.

- The work done by a torque is:

$$W = \int_{\theta_0}^{\theta} \tau(\theta')d\theta'$$

- For the special case of constant torque:

$$W = \tau(\theta - \theta_0)$$

Work Done by a Torque

- The work-kinetic energy theorem is:

$$\Delta K \equiv K - K_0 = W$$

- The angular equivalent of work-kinetic energy theorem is:

$$\Delta K = K - K_0 = \frac{1}{2} I \omega^2 - \frac{1}{2} I \omega_0^2 = W$$

- For constant torque we can write:

$$\frac{1}{2} I \omega^2 - \frac{1}{2} I \omega_0^2 = \tau \left(\theta - \theta_0 \right)$$