Rotation of a Rigid Body

Topics:

- Rotational Motion
- Rotation About the Center of Mass
- Rotational Energy
- Calculating Moment of Inertia
- Torque
- Rotational Dynamics
- Rotation About a Fixed Axis
- Static Equilibrium
- Rolling Motion
- Angular Momentum

Rotational Motion

The figure shows a wheel rotating on an axle. Its angular velocity is

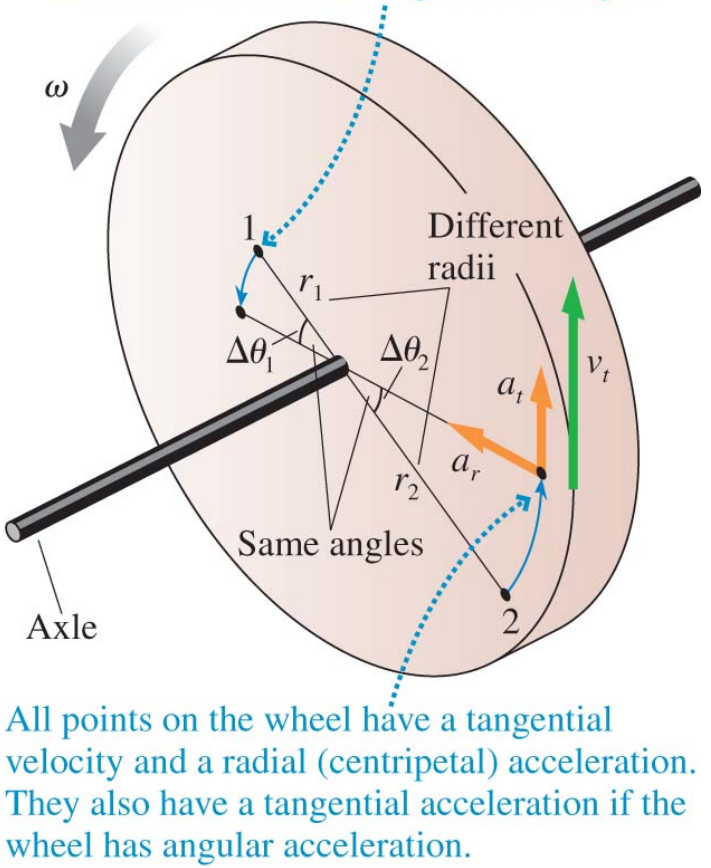
$$\omega = \frac{d\theta}{dt}$$

The units of ω are rad/s. If the wheel is speeding up or slowing down, its angular acceleration is

$$\alpha = \frac{d\omega}{dt}$$

The units of α are rad/s^2.

FIGURE 12.3 Two points on a wheel rotate with the same angular velocity.



Rotational Motion

TABLE 12.1 Rotational kinematics for constant angular acceleration

$$\omega_f = \omega_i + \alpha\,\Delta t$$

$$\theta_f = \theta_i + \omega_i\,\Delta t + \tfrac{1}{2}\alpha(\Delta t)^2$$

$$\omega_f^2 = \omega_i^2 + 2\alpha\,\Delta\theta$$

FIGURE 12.4 The signs of angular velocity and angular acceleration.