
Rotational Variables

- 1) Write out the expression for the average angular (ω_{avg}), in terms of the angular displacement (θ) and elapsed time (Δt).
- 2) Write out the expression for the average angular acceleration (α_{avg}), in terms of the angular velocity (ω) and elapsed time (Δt).
- 3) Write an expression for the average angular velocity (ω_{avg}) in terms of initial and final angular velocities (ω_0 and ω , respectively), where the angular acceleration is constant.
- 4) Combine your answers to the above exercises and derive the rotational kinematic equations in terms of the angular variables (θ, ω, α). Assume the angular acceleration is constant.

Rotational Motion

- 5) An ant is standing on a moving CD, 2 cm from the center. The CD is moving at 80 rpm.
 - a. When the CD makes a 45.0° revolution, what is the length of the ant's path?
 - b. What is the ant's actual linear displacement ($\Delta \vec{r}$)?
 - c. What is the rotational speed of the CD expressed in radians per sec?
 - d. The ant moves to a new position 4.0 cm from the center.
 - i. What is the angular velocity of the ant compared to its speed at $r = 2.0$ cm?
 - ii. What is the tangential speed of the ant compared to its speed at $r = 2.0$ cm?
 - e. The ant then moves to the center of the CD. What is the angular velocity and tangential speed of the ant as the CD rotates?