

SECTION OVERVIEW

6.3: Uniformly Accelerated Motion

If the only force on a body is a resistive force that is proportional to its speed, the equation of motion is

$$m\ddot{x} = -b\dot{x}.$$

One thinks, for example, of Stokes's equation for the laminar motion of a sphere through a viscous fluid, in which the resistive force is $6\pi\eta av$, where η is the coefficient of dynamic viscosity. If we divide both sides of the equation by the mass m , we obtain

$$m\ddot{x} = -\gamma\dot{x},$$

where $\gamma = \frac{b}{m}$ is the damping constant. It has dimension T^{-1} and SI units s^{-1} .

Topic hierarchy

6.3A: Resistive Force Only

6.3B: Body falling under gravity in a resisting medium, resistive force proportional to the speed

6.3C: Body thrown vertically upwards with initial speed v_0

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