Air Resistance – Concepts

INTRODUCTION

When a moving object is in contact with objects in the surroundings, some of the object's kinetic energy can be dissipated, or transferred to the surroundings, which typically become hotter. You've encountered one type of dissipative force, sliding friction, which depends only on the objects and how they contact (coefficient of friction and normal force).

However, some resistive forces, like air resistance, depend on the speed of the object. In this lab, you will investigate how air resistance is related to speed. Figuring out this relationship is a little tougher than just looking up an equation, which may yield conflicting information. This is one of the most common models for air resistance,

$$|\mathbf{F}_{\text{air}}| = bv \tag{1}$$

where v is the object's speed through the air, and b is a drag coefficient that depends on air density and the object's size and shape.

However, other sources may use this model for drag instead,

$$|\mathbf{F}_{\text{air}}| = cv^2 \tag{2}$$

where c is again a drag coefficient.

Notice that one equation shows drag depending on the object's speed, while the other depends on speed squared. So even with the ability to look the equations up, it's sometimes still necessary to conduct an experiment to determine which equation is more applicable to a particular situation.