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Projectile Motion: The "Coming and Going" Phenomenon

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ABSTRACT

During elementary physics courses, many examples in mechanics are studied without considering air resistance effects. We can mention, for example, projectile motion and free fall, among many others. Only brief studies of such systems in classical mechanics courses consider linear air resistance ($F_{\text{drag}} \propto v$), which is the simplest model to account for the drag effect by modeling objects moving in viscous media with small velocities (more precisely, small Reynolds number). Quadratic air resistance ($F_{\text{drag}} \propto v^2$), which applies for objects moving in resistive media with high velocities (high Reynolds number), is hardly mentioned, but it can be found in many papers. However, in nature air resistance plays a big role in the motion of bodies and so it must be included when studying any kind of phenomena related to mechanics.

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